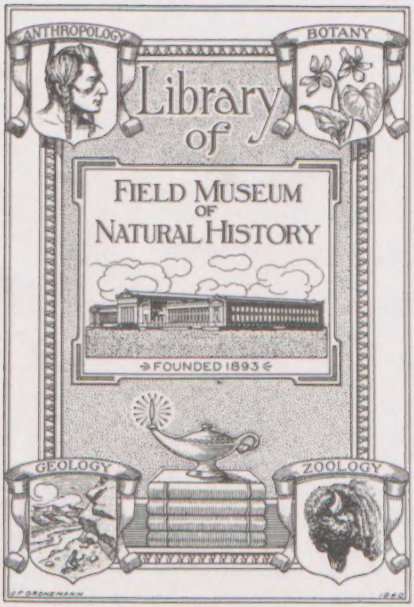
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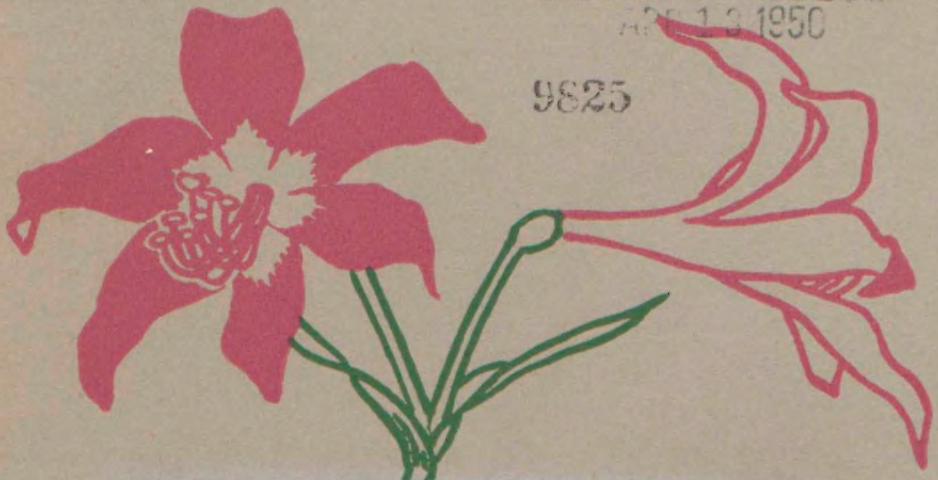

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PLANT LIFE, VOL. 6, NO. 1, JANUARY, 1950

HERBERTIA

1950

HYBRID AMARYLLIS EDITION

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

[IN MEMORIAM—J. MARION SHULL, CONTINUED FROM PAGE 30.]

He received two medals from the AMERICAN IRIS SOCIETY for his iris work, which included his book on iris, illustrated by his own paintings.

The members of the SOCIETY know him best for his hemerocallis breeding and for important contributions to daylily knowledge, including the data card for *Hemerocallis* description, but his skill with pencil and brush covers a wide field. Over 1,700 paintings and drawings of plant subjects alone are credited to him while he was an artist for the U. S. DEPARTMENT OF AGRICULTURE.

His many stimulating papers on hemerocallis, published in Herbertia, as well as the beautiful cover designs in color, and the DESCRIPTIONS of his daylily clones, critically selected for garden value and beauty, will be his best memorial from which all flower lovers now and in the years to come will benefit.

To those who knew him, no further monument is needed than the memory of a fine character devoted to sincere work for the appreciation of beauty and contributions to the improvement of ornamental gardening.

Hyattsville, Maryland —*J. B. S. Norton*

IN MEMORIAM—WILLIAM REYNOLDS DICKINSON, 1875—1949

It is with the deepest regret that we record the death of William Reynolds Dickinson who passed to his reward on April 28, 1948. He was noted for his conspicuous services as a civic leader, and for his pomological and floricultural activities. Mr. Dickinson was born on Sept. 14, 1875 at Chicago, Illinois, and resided on his estate, Hope Ranch, in Santa Barbara, California, for the last 25 years of his life.

He was a charter member of the Society, and he introduced many plants from various parts of the world, and these he tested at Hope Ranch. One of the outstanding achievements concern the colony of *Worsleya Rayneri* (Blue Amaryllis) at Hope Ranch. This is the first successful attempt to grow this species out of doors outside its native habitat on the Organ Mountains near Rio de Janeiro, Brazil.

Mr. Dickinson will be greatly missed by all who had the good fortune to know him.

PREFACE

The 1950 WILLIAM HERBERT MEDAL was awarded to Mrs. Mary G. Henry of Gladwyne, Pennsylvania, a noted plant explorer, lecturer and Research Associate of the ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, for her outstanding achievements toward the advancement of the Amaryllids. Her contributions are particularly notable for (a) *xCyrtanthus* breeding, a field in which she is the only important worker; (b) the collection of the species of *Hymenocallis* native to the United States and Mexico; (b) bringing to the attention of the public of the PINK BELLADONNA LILY, *Amaryllis belladonna* var. *Haywardii;* as well as other outstanding accomplishments in the field of the Amaryllids. Mrs. Henry contributes a very interesting autobiography to this HYBRID AMARYLLIS EDITION of HERBERTIA, which is appropriately dedicated to her.

The charming cover design featuring the PINK BELLADONNA LILY, *Amaryllis belladonna* var. *Haywardii,* from Bolivia, is a contribution from Miss Josephine deN. Henry.

We regret to record the recent deaths of Mr. E. A. McIlhenny, Mrs. Sarah V. Coombs and Mr. Frank J. McCoy. Mr. McIlhenny, a noted naturalist of Avery Island, Louisiana, was a charter member of the Society, and served as Regional Vice-President for the SOUTH MIDLAND until his death. The members have had the privilege of reading Mrs. Coombs' interesting articles on South African Amaryllids as house plants in past issues of HERBERTIA. The concluding part of the last series appears in the present issue. At the time of her death, Mrs. Coombs was working on another series which was not far enough along for publication. Mr. McCoy was a great humanitarian, a Director, and Vice-President of the AMERICAN PLANT LIFE SOCIETY. These stimulating personalities will be keenly missed. In Memoriam notices for all three will be included in future issues of HERBERTIA.

This HYBRID AMARYLLIS EDITION of HERBERTIA contains some valuable articles on this subject. Mr. Hayward brings us up-to-date on the preparation of *Amaryllis* blooms for show purposes. Mr. Mulford B. Foster contributes a fine drawing showing the eight *Amaryllis* flower types for exhibition purposes. This fills a long felt need, and Mr. Foster is to be congratulated on his very fine contribution. There is also a revision of the *Amaryllis* flower types, exhibition classes and score card. Hermon Brown, the Chairman of the *Amaryllis* Committee, reports on his breeding activities; E. J. McCann writes about the McCann double *Amaryllis,* the only double hybrid clones in the trade; Mrs. Armstrong writes about *Amaryllis* breeding in Illinois; Mr. Alders records the history of the Van Meeuwen SUPERIORA and GRACEFUL clones of hybrid *Amaryllis;* Prof. Ballard informs us on the growing of *Amaryllis* in Maryland; the Misses Meadows and Brackenridge write about the BLUE AMARYLLIS, and Mr. Lytel on the BLUE AND IMMACULATE *Amaryllis.* Last, but not least, Mr. Hayward writes about the *Amaryllis* of tomorrow.

In addition, there is a wealth of contributions on the other amaryllids. Mr. Claar, Chairman of the *Hemerocallis* Committee, contributes a very interesting report for 1949; Mr. Voight reports on the *Hemerocallis*

trials at Whitnall Park; Mr. Gilmer on daylily evaluation and a corrective for poor daylily foliage; Dr. Corliss on photographing *Hemerocallis* in color, and on daylily adaptability; Mrs. Henry on a sectorial mutation in *xHemerocallis*, and Mr. Kennell on some observations of a daylily hobbyist.

Mr. Foster contributes important articles on collecting amaryllids, bomareas and alstroemerias in South America. Dr. Dyer contributes the first part of the long needed review of the genus *Brunsvigia*. Mr. Allgeyer writes of Amaryllid culture in Michigan; Dr. Cooley on *Narcissus* in Maryland, and Mrs. Coombs on *Haemanthus* as house plants.

The 1951 issue of HERBERTIA will be dedicated to Mr. Mulford B. Foster, the outstanding contemporary plant explorer for Bromeliads and Amaryllids in South America, who has enriched our Amaryllid collections by the introduction of new species, and the re-introduction of fine species which had been lost to culture.

Hamilton P. Traub
Harold N. Moldenke

January 12, 1950

POSTSCRIPT.—A red letter day. 1—17—50. Today Mrs. Mary G. Henry showed the writer a flowering plant of the first cross involving THE PINK BELLADONNA LILY, *Amaryllis belladonna* var. *Haywardii*, made in 1948. The other parent was a form tentatively referred to *Amaryllis elegans* with medium red-colored flowers. The offspring is an outstandingly graceful plant with the most beautiful carmine (RHS 21/1) flowers. Mrs. Henry's outstanding results, which will be published in more detail in 1951 HERBERTIA, give an indication of the great value of THE PINK BELLADONNA LILY, *Amaryllis belladonna* var. *Haywardii*, itself an ideal pot plant, as a parent in *Amaryllis* breeding.

—*H. P. T.*

Dedicated to
Mary G. Henry

Herbert Medalist—Mary Gibson Henry

Plate 1

MARY GIBSON HENRY

An Autobiography

Little did I know of the influence over my life a little flower would have, when at the age of seven, I first saw and fell in love with that gem of gems, the tiny but utterly precious *Linnaea borealis americana*. It was at Moosehead Lake, Maine, and to this day I never see the *Linnaea* without a thrill. It awoke in me not only a love for and an appreciation of the absolute perfection of the flower itself, but also for the dark silent forest that shelters such treasures.

Must I admit it? I was a "city girl," although I was born in my grandmother Pepper's home in Jenkintown, Pennsylvania. Truly time flies and the years since the day of my birth, August 15, 1884, have passed all too quickly. My esteemed parents were Susan Worrell Pepper and John Howard Gibson. My mother was of Quaker descent. Some of our forefathers came from England with William Penn to help found the City of Philadelphia. George Pepper, my great grandfather, was a member of the first Council of the PENNSYLVANIA HORTICULTURAL SOCIETY in 1828 and had the first greenhouse in Philadelphia. Lawrence Seckel, his brother-in-law, of Seckel Pear fame, was my great, great uncle. My grandfather Gibson was of Scottish descent. He, too, had a greenhouse and was deeply interested in horticulture.

My home was in the center of Philadelphia. We had no garden. In the summer my brother Henry, my sister Adeline and I spent a few weeks in the country with our grandmother and sometimes our parents took us to the mountains or to the seashore.

As a young child I enjoyed nothing more than listening to my father tell of his hunting and camping trips, and too, to stand beside him when he was target shooting. Often I was allowed a few shots. Helping to clean his rifle afterward was a cherished chore. So much so that even today I like no perfume better than the aroma of a humble tube of gun grease from which nostalgia just seems to ooze.

When I was nine my father died, but his influence, that of a man who loved the outdoors and who was gentle, strong and kind, remains with me. Gradually dreams evolved from his stories, but it was many, many years before these dreams turned to realities.

After six years' attendance at Agnes Irwin School, I graduated in 1902. During this period I studied the piano. After my graduation I took up the harp. That summer I had my first glimpse of the Rocky Mountains, when I accompanied my aunt May Gibson to the Colorado Rockies and the Grand Canyon, Arizona. The magnificence of the country thrilled me beyond words.

In 1908 my mother took us to Europe. The "high spot" of the trip, in more ways than one, was a climb with my brother and three guides to the summit of Mont Blanc, altitude 15,781 feet. We were roped together and it was a tremendously exciting experience.

In 1909 I married Dr. John Norman Henry. My husband loved the outdoors even as I did and a tent and a canoe were important factors of our wedding trip. In a few years we became the happy parents of five

children, Mary (now Mrs. Edward M. Davis, 3d), Josephine deNancrede, John Norman, Jr., Howard Gibson and Frederick Porteous.

Norman's profession necessitated our living in Philadelphia, but we had a nice back yard, where grew several Lilacs, some Iris and Narcissus. Best of all, I had a tiny greenhouse.

Our holidays were often camping trips and our children usually accompanied us.

When World War I came, Norman served overseas as Major, Chief of Medical Division, Base Hospital 38. He was Director of Public Health of Philadelphia 1931-1935. He was also President of the Alumni of the University of Pennsylvania.

In 1926 we purchased 95 acres of unimproved land at Gladwyne and built our home, with a small greenhouse attached.

Great grief came to us in 1927, when we lost our youngest son, aged six. I craved solitude and working with my plants was all I cared to do.

During the years in town, some botanical books were acquired and I owe an enormous debt to the botanists who wrote them. "The Travels of William Bartram" proved to be an unending source of inspiration and, when I obtained some contemporary maps, formed the basis for planning many trips. Especially, too, do I owe much to Dr. J. K. Small for his monumental and invaluable "Manual of the Southeastern Flora."

Though I dig long and deeply in the earth these days, most of my digging those long years in the city, was "in the clouds." But it was digging into books that showed me how to dig "in the clouds" and it was digging in "the clouds" that taught me to dig into the good brown earth.

In those days in order to obtain rare American plants, it was necessary to import them from abroad. Few were available.

Here let me say that it was 19 years after I was married before I had a whole "day off" by myself without a member of my family. Our children were now grown up. No one appreciated this long term of home duty more than my husband did and he showed his appreciation by saying, "Go to it and go to all the places and do all the things you want to do and I believe are well fitted to do. You have earned it all I will help in every way I can." He was even better than his word. Sometimes he took trips with me but usually he was too busy to go. He supplied me with a car and a chauffeur, Ernest Perks, who is now gardener, and who, after 21 years, continues to drive me on my trips. My car is outfitted with an "attic," an electrically lit desk and a bookcase. The rear compartment is insulated and ventilated so that newly collected plants travel comfortably. Three plant presses, numerous buckets, spades, etc., are part of the equipment.

My first real plant collecting trip was taken in order to obtain a few specimens of *Rhododendron speciosum*, described so glowingly in Bartram's "Travels." It was unobtainable from either botanical or commercial collections in America or in Europe. My journey of approximately 2500 miles in a car, and many on foot, was eminently successful.

For some years I traveled down and up the Atlantic Coastal Plain at various seasons, always of course in the less frequented areas, usually as far as Florida. I soon learned that rare and beautiful plants can only

be found in places that are difficult of access. Hogs and cattle as well as man are the depredators. Often one has to shove one's self through or wriggle under briars, with awkward results to clothing and many and deep cuts and scratches. Tramps through lonely, pathless forests are often the means to an end. Wading, usually barelegged, through countless rattlesnake-infested swamps add immensely to the interest of the day's work. On several occasions I have been so deeply mired I had to be pulled out. Wearing hip boots in the summer in states bordering the Gulf of Mexico is not practical. It is too hot and the swamps are often deeper than the boots are high.

Fig. 1. Mary Gibson Henry at the age of 15 years.

After a few seasons on the Coastal Plain, the Piedmont Plateau came next. Subsequently my trips were to the Appalachian Mountains. The eastern slopes of these mountains were so beautiful and so enormously interesting that I spent numerous seasons among them. In this wild and rugged country I had many adventures. Usually I was alone, but one day, when Josephine happened to be with me, we were held up by three men with three rifles, who threatend us roughly. It all took place so quickly we felt as though we were at the movies. I had often wondered how it would feel to be held up and really it was not bad at all.

Finally I crossed the "Divide," so well marked by the Appalachian Trail, and spent several more seasons in the mountains of Eastern Tennessee and Alabama.

The last two springs, 1948 and 1949, have been spent in Mississippi, hern Louisiana and the Ozark region in Oklahoma and Arkansas. I have kept diaries of all these trips and made herbarium specimens l the living plants I have collected and many others and have given , some 6000, all annotated, to the ACADEMY OF NATURAL SCIENCES, adelphia. Over a period of years I have made about 20 plant col- ng trips to the Northeastern States and over 60 trips to our Southern es. Counting the Rocky Mountain trips they amount to over ninety. ve many more already planned.

As I learned to know and to love the beautiful flora of our South- rn States, I realized the tragedy that is going on slowly but only urely. Repeated visits to certain localities show the dire need for a ter conservation than is now practiced. Virgin swamps are filled wondrous red Lilies and unbelievably beautiful *Hymenocallis*. e latter are like great exotic butterflies, snow-white and marvelously rant, alas that I must call them rare! The swamps are being used as r holes for cattle. Azaleas and other precious shrubs along the edges ie swamps and rivers are also thus relentlessly destroyed. Just as or worse yet, others are being filled in and used as dumps. Streams rivers, too, are being changed, all in a mad rush to alter the face of earth.

Nor are our hills and mountains safe. Even in the so-called "State sts" men are flagrantly burning out what they call "brush," so that s and weeds may grow to feed the cattle which are allowed to roam y. Often the "brush" consists of fine ages-old Azaleas.

As new American shrubs and flowers are acquired at Gladwyne. of the foreigners are being discarded. It has been a surprising but loyed joy to see these plants from the wild making themselves at e. To be sure, I always try to give them a comfortable spot and a ble soil mixture and spare no effort on their behalf. Beautiful as are in their native home, when given room to spread freely in the ine, with no neighbors to elbow them out of shape, they are hand- r if possible than when growing in the wild and far more adaptable r climate than those from foreign shores.

Magnolias, Halesias, Rhododendrons, Liliums, Hymenocallis, Tril- , Alliums, Phlox, Liatris, Penstemons and Yuccas are my special ites.

After I had lived in Gladwyne five years, the list of shrubs and trees bered about 850. A few years later there were over 1000 different es of woody plants.

Botanical friends have been most kind and generous with gifts of s. I am especially grateful to: Dr. E. T. Wherry, Dr. F. W. Pen- Sir W. W. Smith, Dr. C. Hodge, Mrs. C. Hodge (Dr. Ruth Patrick), . Anderson, Dr. H. P. Traub, Dr. C. Wood, Dr. H. E. Moore, Supt. Huey and Dr. R. Pohl.

Because I am a great lover of Nature, my place is planted as a Wild en. A garden club member once paid me a compliment. She asked could come and see the garden. She came and after awhile said

with disappointment in her voice that she had hunted all around for garden but could not find it.

And now about my Western Trips.

I have spent eleven seasons in the Rocky Mountains from south New Mexico to northern British Columbia, where I could look across

Fig. 2. Mary Gibson Henry in Northern British Columbia, 1931. Photo by Josephine deN. Henry; courtesy Nat. Hort. Mag.

Liard River into the Yukon and have covered thousands of miles on ho and on foot.

The first time I went west, like many tourists, I did not leave t well beaten highways. My next six trips took me far into the mountai

I always travel on horseback with tents and a pack outfit, for this is the only worthwhile way to see the mountains.

The last four expeditions, all in Northern British Columbia, have taken me off the map into unexplored territory and we have been able, on each of these trips, to add new mountains and other features to Canada's map. In 1931 we explored a so-called "Tropical Valley." My husband and I had much correspondence with the Canadian Department of the Interior and they sent us many maps, but the very spot we wanted to go to was almost a blank on every one. The Canadian officials tried to discourage us from going and told us that travel by water was impossible owing to rapids and waterfalls on the rivers, and that by land the distance was great and the country was a pathless wilderness of uncharted mountains and vast bottomless bogs, "muskegs" they are called in the North. We learned that this region was called the "Blind Spot of North America." We were told of the attempts of men who set out to find a short cut to the Yukon district during the gold rush of 1898. Of thousands who started, the Sikanni Indians said only a few, and these half dead, ever reached there. Frozen, drowned or starved, no one knows just how they died, but now and then, later on, we found a rough stone that marked a lonely grave.

The more difficulties and obstacles that arose, the more we wanted to go. After nine months' planning we left Philadelphia on June 25th, 1931, and arrived at Pouce Coupé, Peace River Block, the end of the railroad, on July 1st. Our two daughters and two sons accompanied us. The eldest was 21 and the youngest was 14. Pouce Coupé is about 250 miles northwest of Jasper. We motored to Fort St. John, the last outpost of civilization, where our "outfit" of nine men, fifty-eight horses, tents, etc., was waiting for us.

The Topographical Survey of Canada released one of their topographers, K. F. McCusker, to accompany us and map the country.

After a night of four hours' rest, we mounted our horses and started on our long ride. For the first few weeks we rode along rivers and through meadows. The flowers were simply marvelous. Polemoniums, Delphiniums, Mertensias and Penstemons grew in undreamed of profusion. We rode for miles and miles through meadows so blue they looked like bits of fallen sky.

Later on we came to higher country. There were four attractive species of *Campanula*, an enchanting dwarf *Polemonium* and myriads of *Myosotis*, these, too, in shades of blue. *Oxytropis*, dwarf tufted plants like large headed clovers, came in yellows, blues, pinks and white. We forded innumerable rivers and swam on our horses over the deepest. Our horses and we, too, usually on foot, floundered, struggled and got stuck in the countless muskegs. One horse lost his life and another had to be abandoned. We swam daily in the rivers or lakes and loved the ice-cold water. The temperature mostly fell to below freezing at nights but when the sun shone the mid-days were often deliciously warm. Our shoes were scarcely dry all summer except at night when they usually froze. Twice we were snowed in and once we were caught in such a violent blizzard I wondered if we could weather the gale. Each day we rode

as far as our horses could comfortably carry us and about once a week rested them for a day. On each of these occasions I climbed a mountain. It took us thirty-nine days to reach the Valley we were looking for. Numerous hot springs gave the valley its name. Unfortunately the Indians had burned it over but there was a rank luxurious growth of *Amelanchier, Rubus, Delphinium, Viburnum, Rosa* and *Cornus.*

On the way home we loitered in the mountains on several occasions to hunt. On September 17th, after about 1000 miles on horse and foot in 80 thrilling days, we returned to the "everyday" life of civilization again.

Maj. Aitkin, Chief Geographer of British Columbia, did me the honor to say the name given by McCusker to a beautiful mountain, Mt. Mary Henry, should remain.

Fig. 3. The Henry Home at Gladwyne, Pennsylvania.

I made a collection of herbarium specimens for the ROYAL BOTANIC GARDEN of Edinburgh and another for the ACADEMY OF NATURAL SCIENCES, Philadelphia.

In June 1932 I felt a longing to revisit the wonderful unmapped mountain wilderness of the North. Several telegrams to McCusker and a trip was hastily arranged. July 14th Josephine and I were once again standing beside the mighty Peace River, each of us armed with a free miner's hunting license. In addition to McCusker, we had three men and twenty-one horses. This year's trip could only be a short one. I remembered in 1931, seeing a vast jumble of rugged uncharted mountains west of Redfern Lake and I knew I would find what I wanted there. When I saw Chum, my horse, saddled and waiting for me I was thrilled to the core. Luckily Chum was a big horse and luckily I am small, but 5 ft. 1 in.

and weigh about 112, because besides myself, his load included plant press, rifle, camera, fishing equipment, my precious spade, cans of living plants, etc. One day Jo called to Smoky, "Do you see Mother?" "No" was the reply, "but her horse is coming with a lot of shrubbery and I suppose she is behind it."

Day after day we rode through mountains and valleys that were breath taking in their beauty. Each day brought its own adventures, but our Guardian Angels took good care of us.

On this trip we covered 460 miles on horseback and climbed seven mountains on foot, another 100 miles, in five weeks. Again I made plant collections for the ROYAL BOTANIC GARDEN, Edinburgh, and the ACADEMY OF NATURAL SCIENCES, while Josephine made a collection of insects for the Academy.

Spring of 1933 came and with it a yearning for the great mountainous wilderness of Northern British Columbia where the sky is the only ceiling, the ground is strewn with sparkling flowers and the seasons of spring, summer and autumn are crowded into a few grand and glorious weeks.

With my expedition already planned, I crossed to the north side of the Peace River on June 28th and again Josephine was my companion.

On the steep dry slope above the river a stunning small cactus *Opuntia fragilis* was growing. Among them the blue *Linum Lewisii* swayed side by side with the lovely pale yellow *Lithospermum incisum*. *Allium cernuum* with its pretty drooping cluster of pale pink flowers and *Oxytropis saximontana*, fragrant yellow, were here too. *Campanula rotundifolia* clad in deep blue purple was abundant in the meadow above the bank.

After a couple of days' ride in a little open boat up the river, we reached the tiny town of Hudson Hope. McCusker, four men and twenty-four horses formed our "outfit" and awaited our coming. The rivers were very high this year and the muskegs deeper and wetter than ever. July 1st we started north on our third exploratory expedition, and that night I slept as I love to sleep, with Mother Earth for my bed and only a strip of canvas between the stars above and me.

The great and gorgeous meadows seemed bluer than ever and my heart sang for joy as day after day we rode through the lovely flowers.

Before many days passed, misfortune befell us and we lost 450 pounds of food when we rafted a raging torrential river. The rafts were merely a few logs tied together with ropes. Although some of the men had very narrow escapes, all came through safely. We lived that season on slim rations.

In a few days we came to the mountains, and as we rode up and over the passes, the scenery seemed more magnificent than ever. Occasionally we found the tender green spears of *Allium schoenoprasum sibiricum* and their pleasant flavor gave variety to our meals. Once we got lost when we were overtaken by a snowstorm at nightfall. That season we were caught in four snowstorms and once we were snowed in on a high pass. Maybe there were some rough spots but we had an exciting and successful trip

"Home"—Mary Gibson Henry and Josephine. Photo by K. McCusker; courtesy Nat. Hort. Mag.
Plate 2

and a perfectly wonderful time. That year we mapped a section of the country west of Akie Pass. After 491 miles on horse and foot in forty-one days, we reached again the little town of Hudson Hope on August 7th. That night from a high bank above the Peace River, I watched the moon rise slowly from behind the distant jet black mountains and somehow I knew that one day I would return.

Long before the advent of the spring of 1935, all the old longings for the Northland returned a hundredfold. Truly it must be a long trip this time, Peace River northward up through the Rocky Mountains, then westward across the mountains to Alaska. This was the trip my husband and I had originally planned in 1931. Talks with Indians in 1933 convinced me it could be done. McCusker agreed to go and map the country once more.

July 1st I reached Edmonton and again Josephine was by my side. We took the little twice-a-week train for Pouce Coupé and awoke next morning in a motionless car only to learn the bridges ahead had been washed out during the night. We got off the train.

A man with an open truck offered to take us north. For two days we rode on the floor of the truck, along a rough, scarcely passable road. Then we crossed a river in a little open boat that almost swamped before reaching the far side. A freight train from Pouce Coupé came down and picked us up. Pleased to get a lift, we were not dismayed when told we must sit up all night and could get nothing to eat. The trainmen invited Josephine and me to the rear of the train and for the first time in our lives we saw the sunrise from the high window of a caboose. We thoroughly enjoyed the experience.

The night of July 6th found us sleeping in our tent near Fort St. John and so our trip began. This season we took with us twelve carrier pigeons so I could send messages to my husband and as we carried a receiving set, arrangements were made to have messages from home sent to us every two weeks.

The man in charge of the radio station in Edmonton said my party was the most remote one of any on the North American continent and gave me the most favorable time for receiving, 12.55 A. M. The message always began, "Calling Mrs. Henry somewhere in the Northwest Territory"—the most exciting address I ever had and always thrilled me to the core.

We had a long trip ahead and as usual we travelled snow, rain or sunshine. Mid-day when the sun shone, it was warm and pleasant. On dull days it was about 45° at noon. Evening temperatures dropped rapidly and it usually froze at night. I often wondered how beautiful and fragile looking flowers could stand such extremes of temperature. The lowest I ever saw the thermometer was 12° F.

Daily we rode along rivers and through forests and over the marvelous blue meadows and sometimes when the wind blew they appeared like the waves of the sea.

One day while riding on a steep slippery mountainside, Sunny, my horse, fell over sideways. Jo said I just managed to keep half a somer-

Allium Cuthbertii naturalized at Gladwyne. Photo by Josep[illegible] deN. Henry.
Plate 3

sault ahead of him, as he holled down the steep slope. He was terrified of mud, muskeg and slippery places and before our trip was over he threw me five times. Once, Jo's horse stumbled on a high rocky ridge and my heart nearly stood still as together they fell and disappeared out of sight. They landed about 20 ft. below on deep lichen covered rocks. Mercifully she was none the worse. The men too were thrown at various times.

We traversed Laurier Pass and crossed the upper Halfway River July 23d. July 30th we forded the Prophet River. We usually travelled along game trails and by the footprints we saw they were used by bear, moose, deer, sheep, goat, elk, wolves and caribou. Sometimes we rode above timberline but frequently we had to hack our way through the forest. Often at night the wolves howled about our tents, truly the "call of the wild" and I loved these eerie sounds.

August 4th we rafted the Musqua and crossing a mountain river was always an exciting event.

The evening of August 17th was a memorable one. While fishing, my line suddenly tightened. Having lost my reel I ran back to keep the line taut. Finally I bent down a willow to which I tied the line, waded beyond the hooked fish and soon landed him with my hands. He measured thirty-two and a half inches long and according to Mr. Fowler, Curator of Fishes, Academy of Natural Sciences, is a species of lake trout and it has the largest teeth of any trout he had ever seen. I caught two of these big fish. As time wore on our food ran low, due largely to the fact that several Indians joined our party for some days.

Owing to the great distance we had to cover we were rarely able to leave the trail to hunt, but Jo and I shot all the game we used as food—bear, sheep, deer, goat and grouse. These latter we killed with pistols.

August 25th I took a three day back-packing trip on foot over the mountains, to see Mt. Mary Henry more closely. Two of the men accompanied me. We had no tent and it was fun sleeping under the sky even thought it was blackened by an approaching storm and the snow soon came down on my face. The topographer fell ill here and had to remain where he was, while Glen, the other man, and I went on. I tramped over sixty miles and twice climbed to 8,000 feet in the three days, saw sheep and caribou and faced a pack of wolves and had a perfectly marvelous time.

Near the Toad River we found our friends of former trips, a tribe of Sikanni Indians. Three of them joined us for the remainder of the season. The Indians remonstrated with our men saying they should carry the guns and that Jo and I should wield the pots and pans!

September 3d we passed near Muncho Lake and we tarried a day in the magnificent Gundahoo Pass to climb a mountain.

September 13th I left camp early to hunt and before long I saw a bear which I was lucky enough to kill with one shot. That day Jo, too, killed a bear, evidently Friday the 13th is an unlucky day for bears.

September 16th we were caught again in a blizzard, as we climbed the Pass between Deadwood Lake and Rapid River. At first sleet and

Stenomesson variegatum (Ruíz & Pav.) Lindl., at Gladwyne; photo by Mary G. Henry.
Plate 4

then snow drove in our faces with a force that hurt, as hour after hour we rode into the gale.

September 22d we reached McDame. The first three towns we came to were womenless towns and the men looked at us as if we had fallen out of the clouds. We spent a couple of days in a little open Hudson Bay boat. At night we tied up and slept on the snow covered ground. The water kettle in our tent was nearly frozen solid. September 30th we reached Telegraph Creek, British Columbia and Wrangell, Alaska October 2d.

After covering some 1,200 miles on horse and foot in about 90 days in the wildest and most beautiful section of the North American continent, our trip was over. What joy it was to rise at break of day and watch the rising sun paint the mountain tops with splendor. What joy to ride or tramp over country that for beauty defies description and then at close of day to watch the mountains cast their purple shadows down the valleys and the setting sun flash its crimson glory over the evening sky.

The happy days in the wilderness had passed all too quickly. The difficulties and hazardous places that lay in our way all smoothed over as step by step we wended our way toward our destination.

To one who loves the Northland there are few hardships and any discomfort just goes to show that the best in life is only to be had by contrast and we enjoy good times a hundredfold when hard work brings them to us.

On October 6th we arrived in Vancouver. Next day Major Aitkin, Chief Geographer of British Columbia, came from Victoria to see me and then at his request, with pleasure and pride I drew a map of the vicinity of Mt. Mary Henry, the part the topographer missed when he became ill.

In 1937 and again in 1938 my husband and I went to Scotland where on both of these occasions he made the annual address before the Scottish-American War Memorial in Edinburgh.

On October 4th, 1938 I became a widow.

World War II came to pass and I was a four-star mother. The United States Army used the men I took north and according to the topographer, my 1935 Expedition formed the basis for the planning of the ALCAN HIGHWAY.

As a field botanist, duty calls me to those fertile areas of our southern states where so many treasures still lurk in out-of-the-way corners, but to anyone who loves the Northland, with its rugged mountains and blooming valleys, it is needless to say that I want, hope and plan to return. The fact must be faced, however, that for adaptability to our climate, the plants from the Southeastern States succeed probably 90% while comparatively few of those from the far north seem able to survive our long hot growing seasons.

However, when my thoughts dwell on that far, far Northland, when those miles and miles of great blue meadows come to mind and above them all the mountains clear cut against a dazzling sky, almost I can see my little tent snugly nestled on a mountain side and catch a whiff

of campfire smoke and I would rather go there than anywhere else in the world.

Responsibilities at home are great now, my gardens are a permanent fixture endowed by me and known as the HENRY FOUNDATION FOR BOTANICAL RESEARCH.

In addition to my interest in the out-of-doors, winters have found me enmeshed deeply in the routine work of my tiny greenhouse and six cold frames. There are about 600 pots and flats to be repotted and taken care of and that duty devolves entirely on me. Most of the pots contain Amaryllids and what began as "winter fun" has turned into a serious breeding program, especially with that charming family of plants, *Cyrtanthus*, particular favorites of mine.

Other interests and problems that have engaged much of my time concern the genus *Lilium*. One of the happiest occasions in my life

Fig. 4. (Center background) MT. MARY HENRY, Northern British Columbia. Photo by Josephine deN. Henry.

was when I had the privilege and pleasure of describing my new species of Lily, *Lilium iridollae* in "Bartonia" No. 24. 1946.

Deciduous Rhododenrons are another interest and I have collected over 60 native species and natural varieties of them. I described many of these in the 1946 Rhododendron Year Book of the ROYAL HORTICULTURAL SOCIETY. Perhaps my most useful work in this genus is the raising of a new race of summer blooming Azaleas that flower the end of July and early August. These are the result of reciprocal crosses between the rich scarlet *Rhododendron prunifolium* and the pure white *Rhododendron serrulatum* and are, indeed, a beautiful series of mid-summer flowering shrubs in shades of pink.

Josephine has taken over 500 colored photographs (kodachromes) of my rarest and most beautiful plants. These pictures were all taken in my gardens after the plants became established. She has mounted them in glass and I use them in my lectures.

Many of new plants have "stepped out" in the world, for I have placed over 100 in the hands of propagators and commercial growers.

In 1947, at the invitation of Sir William Wright Smith, I gave two lectures at the Royal Botanic Garden, Edinburgh, entitled "Uncommon American Shrubs and Plants," and "Beyond the Frontier in Northern British Columbia." After that I gave a lecture on March 18th before the Royal Horticultural Society, London, entitled "Uncommon American Shrubs and Plants." This lecture was published in entirely in the Journal of the Royal Horticultural Society, October 1947.

In 1948 I was invited to give a series of lectures on my trips into Northern British Columbia before the Royal Scottish Geographical Society. I sailed for Great Britain October 22nd. I was also asked to give a lecture at the Royal Botanic Garden in Edinburgh. This was done on November 11th. It was, "More Rare Shrubs and Plants at Gladwyne."

The lectures before the Royal Scottish Geographical Society were as follows: Dundee, November 10th, Aberdeen November 16th and Glasgow November 17th. The title of the lecture was "Beyond the Frontier in Northern British Columbia." My fourth lecture was in Usher Hall, Edinburgh on November 18th, when the Royal Scottish Geographical Society awarded me their "Mungo Park Medal" for "Explorations in Northern British Columbia." They gave me a wonderful welcome and someone said that there were over 1,500 in the audience, the largest crowd they had ever had.

1949. Three of my children are married and there are eleven grandchildren.

I spent an extremely worthwhile spring in the swamps of Louisiana, Mississippi and Texas and the mountains of Oklahoma and Arkansas. *Hymenocallis* were one of the main objectives.

In Oklahoma I had the great good fortune to find the first *Lilium* ever found in the state.

The summer nearly brought disaster to my gardens. My own state, Pennsylvania, Department of Forests and Waters, in collaboration with U. S. Army Engineers, tried to use my place as a dump for dirt and sewage in the so-caled "Clean-up" of the Schuylkill River. Fortunately I was home at the time or I would have lost it all. After a six-weeks' battle, I won the fight, or rather I should say, my friends from both sides of the Atlantic won it for me with their generously worded letters, on my behalf, to the Governor.

Now my beautiful little valley is serene, with its sparkling creeks and virgin woodland and lovely sloping hillsides so grandly crowned by the rugged rocks which form the rock garden.

This little autobiography cannot be ended without a few words of appreciation of the great blessings that have been mine. A beloved family and cherished friends have made my life a supremely happy one.

As for the flowers, although many and many a time I risked my life for them, the flowers have done far more for me than I have done for them.

Most heartily I thank Dr. Traub and the members of the American Plant Life Society for the great honor they have conferred on me by

awarding me the William Herbert Medal for 1950, and also for the pleasure and the privilege of writing this little story of my life.

AMONG MY AFFILIATIONS ARE THE FOLLOWING:

Research Associate, Department of Botany, Academy of Natural Sciences, Phila.
Vice President, Philadelphia Botanical Club.
Honorary Fellow, Botanical Society of Edinburgh.
Director, The American Horticultural Society.
Member of Council, The Pennsylvania Horticultural Society.
Director, The North American Lily Society.
Correspondent of Lily Committee, Royal Horticultural Society, London.
Member of Executive Committee John Bartram Association.
Honorary Member, Four Counties Garden Club, Garden Club of America.
Member Executive Committee, Bowman Hill Wildflower Preserve.
Member of Natural Science Board of Maria Mitchell Association.
Associate Editor, Bulletin, American Rock Garden Society.

AWARDS:

Mountain named Mt. Mary Henry, 1931, by Department of Lands of British Columbia.
Schaffer Gold Medal, 1941, Pennsylvania Horticultural Society, for "notable contributions to horticulture."
Silver Medal, 1946, Massachusetts Horticultural Society, Six Plants of "Lilium philadelphicum showing color variations."
Mungo Park Medal, 1948, Royal Scottish Geographical Society, for "Explorations in Northern British Columbia."
Herbert Medal, 1950, American Plant Life Society.

ARTICLES ON HORTICULTURE AND GENERAL BOTANY

1. Orchids All My Own—The Orchid Review, Great Britain, September 1924.
2. Collecting Plants Beyond the Frontier in Northern British Columbia—Nat. Hort. Mag. 1931 Expedition 4 parts Jan. Apr. July Oct. 1934; 1932 Expedition 2 parts Apr. July 1935; 1933 Expedition 2 parts Apr. July 1949.
3. Rare Southern Shrubs—Bulletin Garden Club of America, November 1935.
4. Native Plants that Should be Better Known—Bulletin Garden Club of America, Nov. 1937.
5. New and Old *Hemerocallis*—Little Gardens, Seattle, Washington, 1937.
6. *Lilium Grayi* at Home—R. H. S. Lily Year Book, Great Britain, 1938.
7. A Yellow *Lilium Superbum* and a Few Other Liliums—American Lily Year Book, 1939.

8. Some Eastern Penstemons—National Horticultural Magazine, January, 1940.
9. Uncommon Foreign Shrubs that should be Common—Bulletin Garden Club of America, May, 1940.
10. Trilliums Bring Spring—House & Garden, March, 1941.
11. *Lilium Bakerianum*—American Lily Year Book, 1942.
12. *Cyrtanthus* in the Little Greenhouse—Herbertia, 1942.
13. A Rock Garden of Natives—Bulletin American Rock Garden Society, Year Book, 1942-1943.
14. Our Splendid Eastern Gentians—National Horticultural Magazine. April, 1943.
15. Some Amsonias at Gladwyne—Bulletin, American Rock Garden Society, Mar. Apr., 1944.
16. *Lilium Superbum* Variations—American Lily Year Book, 1946.
17. A New Lily from Southern Alabama and Northern Florida—Bartonia No. 24, Phila. Bot. Soc., 1946.
18. *Penstemon dissectus*—Bulletin American Rock Garden Society, July Aug. 1946.
19. Deciduous Rhododendrons at Gladwyne—Rhododendron Year Book R.H.S. Great Britain, 1946.
20. Uncommon American Shrubs and Plants—Journal of R.H.S. Great Britain, Oct., 1947.
21. Four Little Known Native Violets—Bulletin, American Rock Garden Society Year Book, 1947-1948.
22. A Pink *Amaryllis*—Herbertia, 1949.
23. *Lilium Michauxii* at Gladwyne—R.H.S. Lily Year Book, Great Britain, 1949.
24. *Iris verna* at Gladwyne—Bulletin American Rock Garden Society, May June 1949.
25. *Lilium Iridollae* at Gladwyne—Year Book North American Lily Society, 1949.

[Various other articles on plants are not listed.]

AMARYLLIDS AT GLADWYNE

Agapanthus africanus var. *Mooreanus*. Outside.

Allium acuminatum, large flowered form; outside. *Allium albopilosum*. Oustide. *Allium atropurpureum*. Outside. *Allium cernuum*. New var. Undescribed. Outside; Col. by M.G.H. *Allium cernuum*. Deep purple var. Outside. Col. M.G.H., outside. *Allium Cuthbertii*. Collected by M.G.H. western Georgia. Outside. *Allium flavum*. Outside. *Allium glandulosum*. From Dr. Emery Moore. Frame. *Allium Nuttallii*. Outside. *Allium oxyphilum*. Outside. *Allium pedemontanum*. Outside. *Allium stellatum*. Deep variety; from Dr. Edgar Anderson. Outside. *Allium yunnanense*. Pink form; outside. R.B.G. Edinburgh. *Allium* (2 species collected in Missouri by Dr. Edgar Anderson 1949); outside. *Allium* (4 species collected by M.G.H. in Oklahoma 1949); outside. *Allium* (1 species collected by M.G.H. in Missouri 1949); outside. *Allium* (2 species collected by Dr. E. T. Wherry 1948).

Amaryllis ambigua: Dr. Stoutmeyer. Lift for winter; outside. *Amaryllis advena. rosea.* Greenhouse. *Amaryllis belladonna* var. *Haywardii.* Greenhouse. *Amaryllis immaculata.* Dr. Stoutmeyer. Lift for winter; outside. *Amaryllis organensis.* Greenhouse; from Mr. Foster. *Amaryllis reticulata* var. *striatifolia.* Collected and given to me by Mr. Foster; greenhouse. *Amaryllis reticulata striatifolia* hybrid. Greenhouse. *Amaryllis striata.* Sent me from Assam by Josephine Henry. Greenhouse. *Amaryllis sp.* Sent me from Assam by Josephine Henry. Greenhouse. *Amaryllis.* (75 seedlings). Greenhouse. *Amaryllis sp.* Green-flowered, red tips. Greenhouse. Mr. Foster. *Amaryllis* (2 unidentified species collected by Mr. Foster). Greenhouse.

Androstephium coeruleum. Collected by Dr. E. T. Wherry. Outside.

Cooperia Drummondii. Dr. Richard Pohl. Outdoors. *Cooperia brasiliensis.* Collected and given to me by Mr. Foster. Greenhouse.

Crinum bulbispermum. Outside. *Crinum sp.* (from The Everglades, Fla.); Col. by Dr. Carroll Wood. Greenhouse. *Crinum Powellii album.* Outside; lift for winter. *Crinum sp.* (or hybrid), brought from Mexico by Dr. Chas. Hodge and Dr. Ruth Patrick. Outside, mulch.

Crocopsis fulgens. Sent me by Mr. Huey. Greenhouse.

Cyrtanthus obliquus. Greenhouse. From American Plant Life Society. *Cyrtanthus Mackenii.* Greenhous e. *Cyrtanthus Mackenii* var. *lutescens.* Greenhose. *Cyrtanthus parviflorus.* Greenhouse. *Cyrtanthus sanguineus.* Greenhouse. *xCyrtanthus Josephinae.* Greenhouse. *xCyrtanthus Henryae.* (6 clones). Greenhouse. *Cyrtanthus* (also over 150 hybrids); some 15 named and some unbloomed. Greenhouse. [See under "Registration of Amaryllid Clones" elsewhere in this issue for the named clones—Peking, Dinjan, Nehenta Bay, Metivier, and Glad-wyne.]

Galanthus nivalis viridi-apice. Outside. *Galanthus nivalis fl. pl.* Outside. *Galanthus nivalis* var. *octobrensis,* from Royal Horticultural Society. Oustide. *Galanthus nivalis* var. *Sharlocki.* Outside. *Galanthus Olgae,* from Royal Hort. Soc. Outside.

Habranthus juncifolius, greenhouse, from Dr. Traub. *Habranthus robustus,* greenhouse. *Habranthus texanus,* greenhouse.

Haemanthus cinnabarinus, from Mr. Robert Huey, greenhouse. *Haemanthus hirsutus,* greenhouse.

Hemerocallis. In 1937 I wrote a piece for "Little Gardens," Seattle, Wash., describing 34 clones of *Hemerocallis.* Few have been added since then, but some beautiful seedlings have been raised between the pinks and reds.

Hymenocallis sps. are growing here from N. Carolina, S. Carolina, Ga., Fla., Ala., Miss., La., Tex., Okla., Ark. and Mo. They are from 23 localities. Three of these were gifts, the remaining 20 I collected. *Hymenocallis amancaes.* Outside; lift for winter. *xHymenocallis* Sulphur Queen. Outside; lift for winter.

Leucojum aestivum, outside. *Leucojum autumnale,* frame. *Leucojum hyemale,* Col. F. C. Stern; frame. *Leucojum roseum,* frame. *Leucojum vernum,* outside.

Lycoris aurea. Greenhouse. *Lycoris incarnata.* Outside, mulch. *Lycoris radiata.* Outside, mulch. *Lycoris Sprengeri.* Outside. *Lycoris squamigera.* From Mr. John Wallace. Outside. *Lycoris* (2 sps. sent me from China by Josephine Henry.)

Narcissus. Among dozens of varieties, a few of my favorites are: Among the species: *N. triandrus albus;* Among older hybrids: *N. Johnstoni* "Queen of Spain"; Among the comparatively new hybrids: *N.* "Cushendall," *N.* "Hunters Moon," *N.* "Foggy Dew," *N.* "Pink Rim," *N.* "Chinese White," *N.* "Angeline"; For something magnificient: *N.* "Broughshane"; For something gorgeous: *N.* "Dunkeld," *N.* "Chungking"; For picking: *N.* "Cheerfulness," *N.* "Yellow Cheerfulness"; Looking forward to, next spring: *N.* "Green Island," *N.* "Moon Dance," *N.* "Frigid," *N.* "Clockface."

Nerine angustifolia, greenhouse. *Nerine filifolia,* greenhouse. *Nerine* Lady Sterling, from Sir William Wright Smith; greenhouse. *Nerine flexuosa alba,* from Sir William Wright Smith; greenhouse. *Nerine sp.,* unidentified, sent me from China by Josephine Henry; greenhouse.

Pharium elegans, collected in Mexico by Dr. Carroll Wood; frost excluded porch.

Sprekelia formosissima, greenhouse.

Stenomesson coccineum, greenhouse. *Stenomesson flavum,* greenhouse. *Stenomesson flavum, S. variegatum,* etc., col. by Dr. Francis Pennell in the Andes; greenhouse.

Tulbaghia violacea, greenhouse.

Vallota purpurea, greenhouse.

Zephyranthes atamasco. Col. by my daughter, Mrs. Edward M. Davis, 3d in Va. Outside. *Zephyranthes Fosteri.* From Mr. Foster; greenhouse. *Zephyranthes grandiflora.* Greenhouse. *Zephyranthes minuta.* Col. in Mexico by Dr. Carroll Wood. Greenhouse. *Zephyranthes macrosiphon.* From Mrs. Diddell. Greenhouse. *Zephyranthes rosea.* Greenhouse. *Zephyranthes tubiflora.* Mr. Robert Huey. Greenhouse. *Zephyranthes* (6 species unidentified.) Col. in Mexico by Dr. Chas. Hodge and Dr. Ruth Patrick and Dr. Carroll Wood. Greenhouse.

IN MEMORIAM—J. MARION SHULL, 1872—1948

Mr. Shull's life and work is well treated in his autobiographical sketch in Herbertia, vol. 10. 1943. The following short appreciation may be considered as an addendum to the above.

The life of J. Marion Shull was ended September 1, 1948. A few days before he was busy with his drawing, and was enjoying his garden at Chevy Chase, Maryland, a place of floral beauty, adorned especially with fine daylilies and iris, many of which were his own creations.

Mr. Shull was well known in the iris breeding field for many years.

[IN MEMORIAM—J. MARION SHULL, CONTINUED ON PAGE 6.]

I. REGIONAL ACTIVITY AND EXHIBITIONS

PRIMPING AMARYLLIS BLOOMS FOR SHOWING

WYNDHAM HAYWARD, *Florida*

No pampered beauty of the social set receives more care and attention than the choice *Amaryllis* from its grower just before show time. Growing *Amaryllis* is an interesting hobby, but not one which is satisfied by self-indulgence alone. The *Amaryllis* fan is not completely happy until at least a few hundred or a few thousand other flower lovers have seen his finest specimens at their prime and pristine best.

All of which involves as much care and preparation as the displaying of a debutante heiress before the "Four Hundred" in any large American metropolis.

At all major spring flower shows there are classes for Hybrid *Amaryllis*, and special exhibitions or groups of these wonderful spring flowering bulbs are always welcomed as extra attractions whether previously provided in the show schedule or not.

The *Amaryllis*, being the greenhouse bulb supreme for spring flowering, and of course the same for sub-tropical outdoor gardens, is a bulb of character and temperament. It blooms in the spring . . . but just when, cannot be foretold precisely.

Give an expert florist bulb forcer a few hyacinths and tulips and he can tell you to a day when they will come into full flower and he can plan ahead just how many pots of daffodils he will have for the grand display date. But the *Amaryllis* is different. If the grower pots up 100 bulbs January 1st, he cannot be sure just how many bulbs he will have in bloom for an early March show, or a mid-April display, for that matter. The response of the 100 bulbs will be varied and disconcerting. Grown under similar conditions, all bulbs being $2\frac{1}{2}$ inches in diameter and up (the usually regarded blooming size), some of the bulbs may come into bloom by late February. Others may wait until late April or May and some will not bloom at all. This is of course due to the mixed parentage of the bulbs which may have included spring, fall and winter blooming species. With named clones, it will be possible to obtain greater precision in timing for blooms.

Thus the complex hybrid character of the bulbs genetically is responsible for this uneven forcing situation. Possibly in the years to come, as named clones become available in quantity from Holland and in this country, schedules of forcing dates can be worked out so that the grower can know what to expect if he pots up 10 to 100 bulbs of PINK BEAUTY or SCARLET LEADER on a given date, and grows them along under the most approved methods.

At present, the only thing that can be done is to pot up bulbs of the greatest possible uniformity as to maturity, date of digging, curing and storage, and bring these on as uniformly as may be with bottom heat and a heated greenhouse, so as to have the largest possible number in bloom at a given period. If the show date is early or late, the bulbs

should be grown with more warmth or less warmth, accordingly. When well established and growing vigorously, the bulbs may be retarded like Easter Lilies by placing in a cold house or at least growing them under cooler conditions.

The Dutch growers recommend a certain "hot water treatment" of the bulbs at slightly more than 100 degrees, F., before potting up, to stimulate root growth. They also recommend a bottom heat under the pots of at least 77 degrees F., and an air temperature in the forcing greenhouse of 70 to 80 degrees. These may be taken as optimum for quick forcing, as warmer temperatures will result in soft, sappy growth and weak stems. Grown slightly cooler, the plants will come into bloom slower but the stems will be firmer and stronger.

Accompanying this article is the photograph of a group of five "separate shade" seedlings of the Ludwig Strain, one of the better Dutch *Amaryllis* strains, which the writer displayed at the Winter Park (Fla.) Flower show in early March, 1949 (Figure 5). These were part of some 50 seedling bulbs of the "separate shade" type which bloomed for the writer in pots over a period of several weeks, but the "pink" shade bulbs happened to show more uniformity in growth response than the other shades for some unknown reason, as they are not, to the writer's best knowledge, members of a clone.

Just what the growth response under forcing conditions of the bulbs of a single clone would be, is unknown on this side of the Atlantic, although there would undoubtedly be more or less uniformity, whether as much as in the case of hyacinths, tulips and narcissus remains to be seen. Such experimenting is possible at this time only in Holland where named clones have been developed and are grown in large quantities under carefully observed and controlled conditions.

The question often arises from an *Amaryllis* fancier: "What bulbs should I buy and how many to assure a good showing at the so-and-so spring flower show." Of course the larger and more important the show the larger and more significant will be the showing of the *Amaryllis* that the fancier wishes to present. Sometimes money is no object in this matter. In that case, a wide selection of special strains and even named varieties is available, which can be forced in the greenhouse from bulbs potted as early as they may be obtained in regular trade channels.

Too early potting may result in too early blooms if the weather is warm through the winter months. In other words, the peak of bloom in a planting may be past by the middle of March, if the grower does not exercise care in reducing the temperatures and "holding back" his more advanced bulbs. Several seasons of practice and experimentation will be necessary before a grower can become well versed in the technique. It is easier with potted bulbs which have been established for a season or two. The bulbs may then be dried off uniformly and forcing started with greater expectation of a common growth response.

Once the bud has cleared the neck of the bulb in its course to blooming stage, the final result is only a matter of a few weeeks, three or four, under conditions of adequate warmth in the greenhouse. In the South a warm spell in February will bring many bulbs into bloom which in a

normal year would not be in flower before late March or early April.

During the hey-day of big time *Amaryllis* shows in Central Florida, from 1934 to 1940, the peak of the season's bloom was selected several weeks in advance by a study of temperature conditions and the appearance and behavior of the bulbs in various field plantings. Sometimes a sudden cold spell would damage bloom scapes which were almost ready to open in the fields before a show. Sometimes a warm spell would occur which would bring the peak of the blooming season early in March to mid-March instead of at the end of March to mid-April where it usually

Fig. 5. *xAmaryllis;* prize-winning exhibit of Ludwig pink clones, shown by Wyndham Hayward at Winter Park, Fla., Flower Show, 1949.

came. These were the vicissitudes of growing complex *Amaryllis* hybrids.

The only method for the grower to have a large and successful showing at a given exhibit date was to have ten times as many bulbs as he would need under special care and attention, and then with good luck he would have half as many as he would like to see in bloom on the date. Scarcely 10 per cent of the growers' best blooms were ever open at full bloom on the date of a flower show in the writer's opinion. Sometimes a bulb which bloomed for a show one year would not be in bloom for an

Amaryllis show date until several years later through the vagaries of nature.

Only continued research with clones of known origin and response will give a proper course of procedure for the *Amaryllis* forcer of the future. It will be a long and difficult test, and it is to be hoped that some leading research foundation, as the Boyce Thompson Institute, will interest itself in the problem and undertake to solve some of the difficulties now facing the *Amaryllis* grower who desires to present a fine display at his local flower show in the spring.

At present the only advice that can be given him is to pot up and force the largest number of the most uniform bulbs available, to give them the most uniform forcing treatment under approved techniques possible, and to regulate growth response by temperature control as required.

×HEMEROCALLIS TRIALS AT WHITNALL PARK BOTANICAL GARDENS

John E. Voight, *Supervisor*
Hales Corners, Wisconsin

More and more flower lovers and garden enthusiasts of our community are recognizing the hybrid *Hemerocallis* as among the more popular hardy perennials of today. *×Hemerocallis*, as displayed here at the trial gardens, have definitely provided an excellent means of acquainting the general public with the advances that are being made and also the versatility and beauty which this plant possesses.

There are at present 146 different clones in the trial collection. Some of the newer ones were added this year and include the following: Red Knight, Red Lady, Cathay, Ming, Challenger, and Elfin. Due to relocating and reorganizing the trial garden in 1948, all plants have not matured equally, making it inadvisable to present any conclusions for publication at this date. Detailed results will be included in future issues of Herbertia.

The trial gardens are located at the south end of Milwaukee County, east of U. S. Highway #100, and west of U. S. Highway #41.

The gardens are open to the public at all times.

DAYLILY REPORT, 1949

Elmer A. Claar, *Chairman, Hemerocallis Committee*

I wish to congratulate Dr. Norton, Mr. Stuntz, Prof. Ballard, the American Plant Life Society and the Hemerocallis Society for compiling and publishing the Descriptive Catalog of Hemerocallis Clones, 1893 to 1948. This is a tremendous job well done and everyone who is interested in daylilies is most grateful to these gentlemen and organiza-

tions. When I first became interested in daylilies there were thirty-three recorded hybridizers and less than a hundred named varieties. I saw the need for this type of work and so I started to compile a card index, with dates, etc., of all the named varieties. So many new hybridizers started working on daylilies that it involved a job I did not feel I could possibly find the time to do well, so I was most happy and relieved to send my lists to these good gentlemen. Congratulations and sincere appreciation for this work.

Singing the praises of our favorite flower and exchanging information and experiences, in addition to the good work of the American Plant Life Society, the Hemerocallis Society and the Round Robins, are more than a hundred clubs of the Men's Garden Clubs of America, who have appointed Head Hemerocalliarians, who are enthusiastically working on daylilies. Joined with these is an ever increasing number of hybridizers, introducers, commercial nurserymen and amateurs. There are at present few iris catalogs that do not have an offering of daylilies.

Many nurseries report that they sell more daylilies than any other flower. This is as it should be for daylilies can be grown in every state of the Union, in most of the countries of the world, in nearly any kind of soil, and under almost every kind of condition, with a minimum amount of care. Some apparently do well everywhere, some do better in one part of the country than in another, and all of them respond to kind treatment rather than neglect. Last year on a trip through Europe, I saw daylilies in every country and was thrilled to spend a day with that 80-some-years-young daylily enthusiast, Amos Perry.

In April and May of 1949, Mrs. Claar and I went to the American Iris Society Meeting in Portland, Oregon. On the way we stopped over in Los Angeles and visited various flower friends. First we stopped at Thomas Craig's lovely home and gardens. I had exchanged a number of daylilies with Tom, who has been really bitten by the daylily bug and is assembling a fine collection and also is hybridizing. With his enthusiasm and knowledge, I predict you will be seeing some fine Craig hybrids in the not too distant future. , I recently received word that lovely Mrs. Craig had been stricken with polio. We are all hoping for a speedy recovery. Things like this should not happen to such fine people.

We arrived in Los Angeles on April 30, a bit too early to see any but the very early blooming daylilies.

While at the Craigs', we met that grand lady Mrs. Douglas Pattison, the Regional Director of the Hemerocallis Society for Region No. 7. I believe that Mrs. Pattison's Quality Garden at Rockford, Illinois, was one of the first places where daylilies made me conscious of their existence. At any rate, my records show that in 1935 I bought Ajax from Mrs. Pattison.

Also present were the Lyons, who have a fine and growing list of daylilies in their garden and catalog, Eric E. Nies, and many other enthusiastic daylily fans.

We called at the Milliken gardens and I took pictures of Mr. Milli-

ken, Miss Joan Salisbury, his effiicent and congenial secretary, and of his gardens and some irises. I have been growing in my garden most of Mr. Milliken's introductions and I am eagerly awaiting the blooming in 1950 of such famous plants as GARNET ROBE, of which Dr. Corliss, after 20,000 miles of travel to most of the daylily hybridizers and growers in America, said, "I still found no variety to top GARNET ROBE." I also am anxious to see in bloom his CATHEDRAL TOWERS, COLONIAL DAME, PARTY GOWN, REDROCK CANYON, RUFFLED PINAFORE, TAMARA, and his latest introduction, HIGH NOON.

Eric Nies specializes in hybridizing spuria irises and he has some that are out of this world. We were lucky enough to be in his garden at the height of their bloom. Mr. Nies made a delightful corsage for Mrs. Claar from some of his spurias. We are growing all of his introduced varieties and some of his seedlings and look forward with a great deal of pleasure to seeing them bloom in our garden. While in Los Angeles, a large group of daylily fans met at the Nies home to see my Kodachrome pictures.

After a stay of a few days at Yosemite, we arrived in San Francisco. We visited the gardens and home of Prof. Sydney B. Mitchell, with whom I had traded daylilies some years ago, and I took Kodachrome pictures of him, Mrs. Mitchell, and their gardens and iris seedlings. I was especially impressed with his broom hybrids and his *Iris Douglasiana*. Next, we had lunch with Carl Salbach and enjoyed his garden and iris introductions. One evening a large group met at Mr. and Mrs. Stafford Jory's home and again I showed my Kodachrome movies of daylilies.

From San Francisco, we went through the redwood forests, on to Seattle, and back to Portland for the Iris Society Convention.

Those attending the Iris Convention visited the home and gardens of the Schreiners, Robert, Constance and Bob. Robert Schreiner is a member of our Plant Life Society Daylily Committee. He has a fine list of daylilies in his catalog and many that are on trial. It also was too early while we were there for daylilies but I am growing his introductions MY OWNE, BESS VESTAL, SALADIN, BROWNEYED SUSAN and JEAN.

One of the highlights for us of this convention was a trip to Corvallis to see Dr. Kraus, with whom we had spent many happy hours at our home, at his place at Lake Geneva, Wisconsin, and at the University of Chicago. The Doctor had shipped about 500 named varieties of daylilies (out of over 1,000 that he was growing) and several thousand seedlings to Oregon and had them growing on about an acre of land. He was not happy with this land and since then has moved them to the Oregon State College's farm. He is sure we are going to have white daylilies and has since written that some of his seedlings are white. He had at Chicago the finest dwarf daylilies that I have seen, and some of the finest reds and pinks. I shall describe some of these later.

We visited the gardens of Dr. R. E. Kleinsorge, Fred DeForest, the National Iris Gardens, the Oregon Bulb Farms, and Walter E. Marx, who has a large collection of various types of plants and who offers a fine lot of daylilies in his catalog.

Our next trip was to the Men's Garden Clubs of America Conven-

tion in Minneapolis, where I met many of the Head Hemerocalliarians of the various clubs and exchanged experiences and had a royal time.

I went out to the Jacob Sass home, near Omaha, on July 10. Hans Sass, Henry Sass, with the other Sass brothers were there, as were Fern Irving (Mrs. E. J.), and Marie Anderson. We also ran over to Bonnington, to the home of Hans.

At the Sass gardens I saw many new things for the first time but Henry said they had just had a severe hailstorm and that the bloom was not typical. I liked Mrs. F. D. Armstrong's HOWDY, a good bicolor, and sent for it. Dave Hall's NORTH STAR was wonderful. It is paler than MOONBEAM. Incidentally, Henry Sass said, "You can buy any daylily that Dave Hall introduces and be sure you are getting a good one." I agree, and will also say the same thing about the Sass introductions.

Among the new things, a plant of GRETCHEN was particularly impressive. It is more like ROYALTY than any other plant I know but ROYALTY has a darker eye zone, while GRETCHEN has larger flowers, is unusually well branched and is a very well balanced plant. Some people have said they thought it the finest daylily that we have. ELSA is a lovely peach color.

Vestal's MYONNE impressed me as better than NABOB and MARY GUENTHER. Her GRACE was very good.

I am growing about all of the Sass introductions. Among the named varieties that I did not have but have acquired this year are EVENING GLORY, a later APRICOT QUEEN, and MIDWEST CAVALIER, a fall bloomer, cream color, with a dark eye zone. I also have acquired the following seedlings: Seedling 46-150—A big orange, was very impressive. Seedling 23-43—A pink bicolor. Henry said it blooms for two months. Seedling 46-125—A yellow. Henry said it is a later, bigger DOROTHY MCDADE. It was not in bloom. Seedling 49-67—A pink. The best pink that I saw. Good color; star-shaped. A KILLARNEY LASS seedling. Seedling 49-66—A velvety-sheen red. I thought this was their best red seedling. HONEY REDHEAD × QUEEN ESTHER.

I am especially fond of CHIEF FONTENELLE, APTICOT QUEEN, and COPPER COLONEL, and their yellows are tops.

I have rather complete notes on a considerable number of daylilies that I saw there but I fear they would not be helpful as the hailstorm did not leave the flowers as typical.

I feel particularly happy about going to the Sass home this year because I had a chance to visit with that grand gentleman, Hans, to whom all daylily fans owe so much. I was shocked, upon receipt of a note from Henry a short while after my visit, to hear that his Uncle Hans had passed away. He was my kind of hero and one of God's noblemen.

On July 17 I went to New England to attend the regional meeting of the Hemerocallis Society at Lowell, Mass. I stayed at Mr. and Mrs. Nesmith's lovely home and visited the gardens of Dr. Irving W. Frain, Harold W. Knowlton, Percy F. Merry at Needham, and Olin R. Howe, Jr., at Holliston. Visitors from nine states were represented at the

meeting. Mr. Robert Allen and I talked daylilies with Mrs. Nesmith until two o'clock in the morning.

Her Grace in the Knowlton garden was so good that I immediately ordered it. In the spring I had added Mme. Recamier, a lovely pink, and Windsor Tan, which is a standout. I liked Pink Prelude very much. This year I bought Bandana, Chianti, Glowing Gold, Rose Unique, Royal Guest, Tallyho, Ta Ming, and Pink Prelude.

We are grateful to Mrs. Nesmith for some of the finest daylilies that we have. Her Pink Charm, Piquante, Vespers, Royal *Ruby*, Sweetbriar, Potentate, Black Falcon, Debutante, Su-Lin, Bold Courtier, Honey Redhead, Far North and Her Grace are outstanding.

Royal Ruby still is the standard but its leaves spotted badly for me this year and I noticed the same thing happening in other gardens, so that this red will be challenged by Garnet Robe, Pimento, Flanders, Seminole Chief, Noen, Bill Wood, Crimson Star, Red Perfection, Papagaio, The Doctor, Flame Fagot, Red Bird, San Juan, Vermilion Cliffs, Trail Blazer, Flambeau, Scarlet Sunset and Flaming Velvet.

Sweetbriar still is standard, challenged by Pink Prelude, Marion Wood, Kraus' Evelyn Claar, Pink Angel, and Laurel.

In the purples, Potentate and Black Falcon are standard. Black Falcon is wonderful at times and sometimes it is terrible. It is challenged by Amherst, Plum Mist, and others.

Mrs. Claar and I were terribly shocked to receive a note from Mrs. Nesmith to the effect that her husband, genial and always smiling Tom Nesmith, had passed away while looking at some plants in their garden. That's the way I should like to go but it is a terrible shock to those who remain. It is hard to imagine Fairmount Gardens without Tom. All daylily fans will join in sympathy for Mrs. Nesmith.

Mr. Stanley E. Saxton gave a talk about the Wheeler daylilies. I am growing or have ordered nearly all of Mr. Wheeler's introductions. I have had some for years. Ruby Supreme is the best of the older varieties. The ones I secured this year obviously were not typical, but I wrote Mr. Wheeler about Cellini as follows: "It is impossible for me to exaggerate about Cellini. This is a perfectly gorgeous lemon yellow and the shape is all that anybody could ask for in a dayliliy. In my opinion, this flower will be a standard for a long, long time. I would say that if you never gave the dayliliy enthusiasts anything but Cellini, that they could not help being most grateful to you for the work you have done." At times Cellini does fade, as do most of the yellows and oranges, but what a shape this old boy has! Bobolink was with me for years and finally bloomed this year. It is very interesting but very small. Easter Morn is another good variety. I do not care for Brackel, but it is big.

I am growing four of Mr. Saxton's introductions, but they have not bloomed for me as yet.

In the fall, a meeting of the Iris Society directors was held in Chicago. I again met such daylily enthusiasts as Harold Knowlton, Geddes Douglas, Robert Allen, Dave Hall and Orville Fay.

I now am growing about 500 named varieties of daylilies (after having lost or discarded about 150) and about 10,000 seedlings. It really is very silly to have so many varieties of daylilies but I want them for comparative purposes, and, anyway, there are a lot of silly people in this world! So what?

Due to my trips and by exchanging information and experiences with other daylily enthusiasts, I acquired the following this year in addition to those already mentioned. I have not seen any of them in bloom.

Ida Norton McClure's PINK ANGEL, a lavender pink.

J. W. House's LIBBY FINCH and CARMEN CORLISS.

LeMoine J. Bechtold's FLAME FAGOT.

Dr. Stout's six introductions this year, ELFIN, RED KNIGHT, RED LADY, CATHAY, MING and CHALLENGER.

Charles H. Dennett, Jr.'s ULYSSES.

H. M. Russell's MRS. HUGH JOHNSON and MICHAEL ROBINSON.

W. T. Wood's BILL WOOD and MARION WOOD.

Dr. Watkin's ALLAPATTAH, JACK AND JILL, and TAMIAMI.

Mrs. Bright Taylor's BRULEÉ and OLIVE BALDWIN.

Miss Vivian Christenson's DAWN GLOW, LUMINOUS, TWILIGHT TIME, ROSE REVERIE and INDIAN HEAD.

Hubert Fischer's TWILIGHT FLOW, ESCIMILLO and some seedlings.

Clint McDade's introductions, AU REVOIR, BRIGHT MORNING, CHICKAMAUGA, DAINTY GIRL, DANNY BOY, GOLDEN PHEASANT, HAROLD PATTERSON, HIAWASSEE, MARIE FAWCETT, MARTIE EVEREST, MERRYMAKER, NORMAN HAMILTON, PEPPERMINT STICK, REGINALD STEED, SHEILA, SPANISH CAVALIER, SONATA, SOUTHERN QUEEN, STRIPEY, WELCOME, WHIPPOORWILL.

And the following of Mr. Amos Perry's recent introductions: ANNE ROSSE, BALLERINE, BATTERSEA, BETTY STEWART, CECELIA, CONSPICUA, DIANA THOMPSON, EDITH SHEWRING, EILEEN, GLADIATOR, GLAMOUR, HELEN LINDSAY SMITH, KATHERINE HARDY-SMITH, MARY BALLARD, PAT, PINK LADY, RUGBY, RUTH, ST. AGNES, and W. B. CRANFIELD.

A word about some of the recent acquisitions in my garden. Last year I secured from Miss Vivian Christenson the daylilies MY VALENTINE and MAGNOLIA. This lady liked MAGNOLIA but said little about MY VALENTINE. MAGNOLIA did not bloom for me but MY VALENTINE was one of the most impressive of the daylilies I am growing. I made up my mind to get more of Miss Christenson's introductions, and I did.

Of Geddes Douglas' introductions, I like FLAMBOYANT best. It is similar in color to Dr. Kraus' MRS. DAVID HALL but is a better proportioned flower relative to the height of the scape. I have heard that his CRIMSON STAR is tops but haven't seen it. RED PERFECTION is similar to and a bit bigger than ROYAL RUBY. DAILY DOUBLE is only occasionally double.

Some of the most outstanding seedlings that I have are those of Mrs. Hugh W. Lester. I am growing her DOROTHEA, EARLY BIRD, FLANDERS, FLORIDA GOLD, LADY BOUNTIFUL, LAUREL, MAID MARIAN, PHOEBUS, seedling No. 6, and SEMINOLE CHIEF, which is a very good red. Not all of

these bloomed but those that did were outstanding. EARLY BIRD is very superior, the color of WINSOME but very large and star-shaped. DOROTHEA I believe I like better than any other eyed variety that I have seen. FLANDERS is a bit bigger and better than ROYAL RUBY or Geddes Douglas' RED PERFECTION. Mrs. Lester is most enthusiastic about LAUREL, but unfortunately it did not bloom for me.

I have heard many favorable comments about Ralph Schreiner's KNIGHTHOOD but it did not bloom for me nor have I seen it in bloom. Schreiner-McDade's bicolor JEAN is very good.

Of Dr. Traub's older introductions, I like DR. STOUT the best. GENERAL MACARTHUR and INDIAN CHIEF I cannot get to bloom. SAN JUAN is a fine red and DUCHESS OF WINDSOR is good.

Of the sixteen varieties that I have on trial for the United States Government (Dr. Traub's hybrids) I like best METRA, GOLDEN TRIANGLE and LEMON TULIP. However, Dr. Corliss said that PAPAGAIO was very good, so I shall look at it more carefully next year.

Daylilies certainly do vary a great deal, from hour to hour, and from day to day. Mr. Hayward's SALMON ROSE is always very good, but his MINNIE is very poor at times and very good at other times. Another flower that I have had for many years and with which I had not been particularly impressed until this year is IRENE, but this year I had two clumps of it that were as good as any of the orange varieties that I grow. However, these were established plants and some of the others were not.

Dr. Kraus' EVELYN CLAAR is the best lavender-pink that I have seen. His JOANNA HUTCHINS is a good orange. VERMILION CLIFFS and FLAMBEAU are good reds.

Among Dr. Norton's daylilies, MONGOL is one of the largest yellows that I grow and is very much worthwhile as is.

In Beehtold's things, GOLIATH is huge and outstanding. GARDEN CHARM is a delightful yellow. I just secured FLAME FAGOT this year. BRONZE GLOW's name describes this nice flower. I can't share Mr. Beehtold's enthusiasm for KINDLY LIGHT, which is a large flower but is spider-like in shape. I prefer the overlapping type. LOVELINESS is a wonderful eyed variety.

Fewkes' FLAVINA continues to be the best early lemon yellow.

Among the Russell varieties that have impressed me are QUEEN OF GONZALES, although it has so much substance that it tends to be coarse. PAINTED LADY is my choice as standard in the polychrome types. BETTY SLICK is a huge and fine flower. I do not seem to be able to keep MARY GUENTHER and MISS HOUSTON alive in my garden. ATHLONE is a fine bicolor. METEOR is an eyed variety, with a huge flower, nice, but it doesn't seem to stand up well for me. MONTE, also, is fine. FRANCES RUSSELL, LILLIAN RUSSELL, JEWEL RUSSELL, and GUEST STAR are all good.

I am growing everything that Dr. Stout has introduced with the exception of JUBILEE, which is of doubtful hardiness in this climate. I am growing all of his 1949 introductions but haven't seen them in bloom, and

also I have not seen BLANCHE HOOKER or FIREBRAND in bloom. Among his introductions I like ROSE GEM the best. AFTERGLOW is a beautiful flower. DOMINION, ALADDIN, TARUGA are good. BICOLOR and CABALLERO are good bicolors. PORT, SACHEM and RED BIRD are good reds, and ZOUAVE and WAUBUN are interesting. I also like CIRCE, GEORGIA and BERTRAND FARR. PATRICIA has the form of flower which pleases me most in a daylily but it is a sparse bloomer.

I phoned Dr. Stout from my home prior to going to New England this year and he told me that he did not have anything in bloom that would be worth a trip to his home from New York City.

While I was down at the Farr Nursery last year, Mr. Seyler pointed out to me several rows of plants which Dr. Stout describes in an article in the 1949 Herbertia as a new race of double flowered daylilies. They were not in bloom while I was there. The best double that I have seen in bloom is a seedling of Dr. Kraus'.

After hybridizing for twelve years, with thousands of seedlings, I had named but a few and had not introduced any plants until Clint McDade persuaded me to introduce some of my seedlings through the Parry Nurseries, Signal Mountain, Tenn. This year, they introduced CHAMELEON, a red which fades to pink; JEAN LAFITTE, a big flower that has received a lot of "Oh's" and "Ah's" from visitors in our garden; and PLUM MIST, a purple toned red which I believe is worthwhile.

After reading this article, I can see that I am getting verbose in my old age.

Yours for more and better daylilies!

[COOMBS—S. AFR. AMARYLLIDS, CONTINUED FROM PAGE 128.]

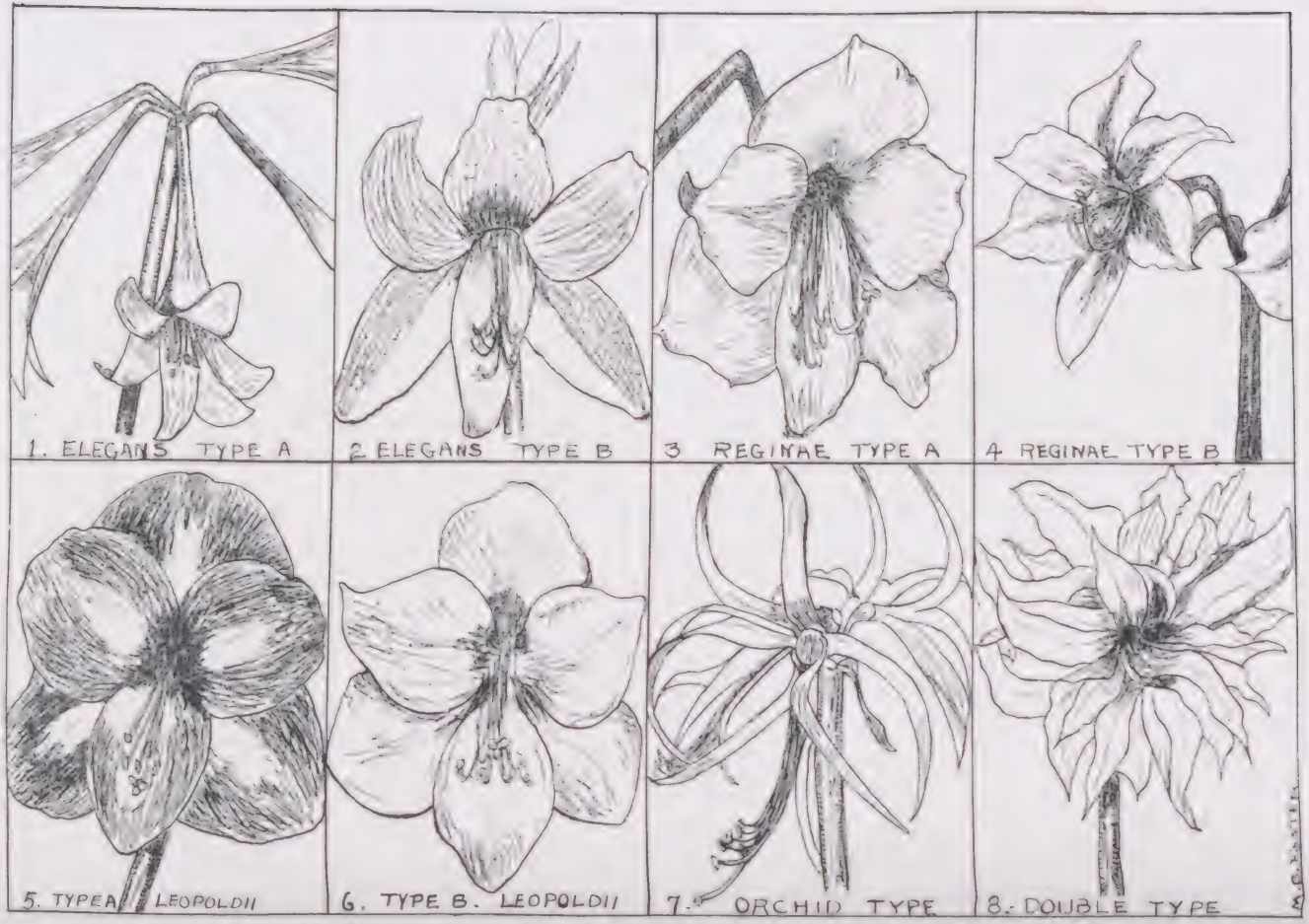
flowers. It needs much the same treatment as *H. Katherinae*. The umbel includes up to 100 coral-red flowers, with red long-exserted filaments with prominent yellow anthers. It has been cultivated for a long time in England.

Haemanthus natalensis Pappe, with red flowers, very dense clusters and *H. puniceus*, with pale scarlet, almost pink flowers, rarely white are other species, the latter one obtainable in the U. S.

Haemanthus albiflos Jacq., from the eastern divisions of the Cape Province is not so beautiful as *Katherinae* but is rather interesting. Also it may be obtained, like *coccineus, Katherinae* and *puniceus*. It grows from 2-4 leaves, strongly waved and veined, soft deep-green above and paler below and covered with fine white hairs, especially at the margins. The flowers are creamy white and form dense, rounded umbels with red berries following the flowers. The white stamens protrude with bright yellow anthers. There is a collar of green striped white bracts. It is said to resemble a "small dish mop"! Light moist humus and partial shade.

The illustration of *Haemanthus tigrinus* [Fig. 26] was obtained through the courtesy of the South African Railways and Harbours.

[COOMBS— S. AFR. AMARYLLIDS, CONTINUED ON PAGE 147.]



x Amaryllis Flower Types for exhibition purposes: drawing by Mulford B. Foster

Plate 5

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

AMARYLLIS FLOWER TYPES, EXHIBITION CLASSES AND SCORE CARD

HAMILTON P. TRAUB, *Maryland*

The following revisions of the classification of *Amaryllis* flower types, exhibition classes (Table 1) and score card (Table 2) have been adapted from HERBERTIA 5: 141-143. 1938. This adaptation is tentative and subject to further changes as shown to be necessary under actual exhibition conditions.

CLASSIFICATION OF FLOWER TYPES

Amaryllis shall be subdivided tentatively into the following flower types on the basis of the characters indicated—

1a. LARGE-FLOWERING GROUP:
  2a. Flowers single:
    3a. Flowers distinctly drooping; trumpet- or somewhat funnel-shaped:
      4a. Tepaltube very long ..... ELEGANS TYPE A.
      4b. Tepaltube short ..... ELEGANS TYPE B.
    3b. Flowers distinctly upright, horizontal, or only very slightly declined; tepaltube short:
      5a. Flower somewhat funnel-shaped at throat:
        6a. Flower compact, tepalsegs rounded or pointed ..... REGINAE TYPE A.
        6b. Flower not compact, tepalsegs pointed ..... REGINAE TYPE B.
      5b. Flower wide open, almost flat:
        7a. Flower fairly regular, compact, tepalsegs rounded ..... LEOPOLDII TYPE A.
        7b. Flower fairly regular, compact, tepalsegs acute or pointed ..... LEOPOLDII TYPE B.
        7c. Flower irregular, spidery ..... ORCHID TYPE
  2b. Flowers semi-double or double ..... DOUBLE TYPE
1b. SMALL-FLOWERING GROUP:

(There are no subdivisions on the basis of flower type at present.)

The fine generalized illustrations of these eight flower types, shown in Plate 5, were made by the well-known artist, and explorer for bromeliads and amaryllids, Mr. Mulford B. Foster, of Orlando, Florida. This first rate contribution will be appreciated by all interested in *Amaryllis*.

ABBREVIATIONS FOR FLOWER TYPES

When referring to the eight flower types, the following abbreviations may be used:

E—A = Elegans Type A	E—B = Elegans Type B
R—A = Reginae Type A	R—B = Reginae Type B
L—A = Leopoldii Type A	L—B = Leopoldii Type B
OR = Orchid Type	D = Double Type

EXHIBITION SECTIONS AND CLASSES

The small-flowering group (Miniature) is not subdivided for show purposes at present, and these are to be exhibited under Section A, Class 1, below. (See TRAUB & MOLDENKE—AMARYLLIDACEAE: TRIBE AMARYLLEAE, 1949, pages 87-107, for detailed descriptions.)

The large-flowering group of hybrid *Amaryllis* shall be divided for exhibition purposes into three major sub-groups—(1) SHOW CLASSES in which flower form and size standards are the important considerations and other plant characters are subordinate; (2) DECORATIVE CLASSES in which the use of the plant—window garden, conservatory, forcing, landscape, rock-garden, etc., value are most important and (3) DOUBLE-FLOWERING CLASSES.

All subjects in the three Grandiflora sub-groups are to be exhibited under the appropriate classes in Section A, classes 2 and 3, and Sections B, C, D, and E, below.

CLASSES AND AWARDS (PRIZE SCHEDULE)

Each species or hybrid exhibit may consist of one or more potted flowering plants, or one or more cut flower scapes; but it is recommended that three or more potted flowering plants or three or more cut flower scapes for each entry be required whenever practicable.

Prizes and other awards are to be made by a panel of competent local judges, or judges invited from other regions.

SECTION A. Genus *Amaryllis*—botanical species (Amateur and professional)

Class 1. Single species entires—MINIATURE GROUP. (See TRAUB & MOLDENKE—AMARYLLIDACEAE: TRIBE AMARYLLEAE, 1949, pages 87-107, for detailed descriptions.)

Class 2. Single species entries, GRANDIFLORA GROUP. (See TRAUB & MOLDENKE—AMARYLLIDACEAE: TRIBE AMARYLLEAE, 1949, pages 107-134, for detailed descriptions.)

Class 3. Best collection of *Amaryllis* species.

SECTION B. Hybrid *Amaryllis*—Collections and Displays (Amateur Classes)

Class 11. Best Amateur collection of less than 10 grandiflora clones.
Class 12. Best amateur collection of 10 or more grandiflora clones.
Class 13. Best amateur collection of Decorative clones.
Class 14. Best amateur collection of double clones.
Class 15. Best amateur display.

SECTION C. Hybrid *Amaryllis*—Collections and Displays (Professional Classes)

Class 21. Best collection of less than 10 grandiflora clones.
Class 22. Best collection of 10 or more grandiflora clones.
Class 23. Best collection of Decorative clones.
Class 24. Best collection of double clones.
Class 25. Best display of grandiflora clones.

SECTION D. *Amaryllis* Floral Arrangements (Amateur and Professional)

Class 31. Best *Amaryllis* floral arrangement (Amateur)

Class 32. Best *Amaryllis* floral arrangement (Professional)

SECTION E. Hybrid *Amaryllis*—Entries for named clones (Elegans, Reginae, Leopoldii, Orchid and Double types).

The classes for named clones are indicated in Table 1. At the right in column one is indicated the predominant color value of the flower, and in the succeeding columns are the classes for the eight flower types under the abbreviations—E-A, E-B, R-A, etc. It should be noted that for each color class there are eight possible flower types. Only entries with the same number compete with each other. At present only some of the classes will be used because there are no yellows, lilacs and blues.

TABLE 1. Section E: Entry classes for Hybrid *Amaryllis*, Elegans, Reginae, Leopoldii, Orchid and Double Classes.

Predominant color value	Eight flower types, (abbreviations)							
	E-A	E-B	R-A	R-B	L-A	L-B	OR	D
White	50	75	100	125	150	175	200	225
Near white (with slight markings	51	76	101	126	151	176	201	226
Yellow	52	77	102	127	152	177	202	227
Bronze	53	78	103	128	153	178	203	228
Light orange	54	79	104	129	154	179	204	229
Orange	55	80	105	130	155	180	205	230
Pale red (pink)	56	81	106	131	156	181	206	231
Medium red	57	82	107	132	157	182	207	232
Dark red	58	83	108	133	158	183	208	233
Violet red	59	84	109	134	159	184	209	234
Lilac and blue	60	85	110	135	160	185	210	235
Polychrome (more than two colors)	61	86	111	136	161	186	211	236
Any other color	74	99	124	149	174	199	224	249

SCORE CARD

The score card for grandiflora hybrids is given in Table 2.

TABLE 2. Score Card: Hybrid *Amaryllis*—Large flowering group (Grandiflora Classes—Elegans, Reginae, Leopoldii, Orchid and Double).

Note.—All flowers are to be expanded in ½ or more direct sunlight. No entry is to receive first prize unless a rating of at least 86 points is merited; second and third prizes may be awarded to entries rating from 76 points up. A score card for the decorative sub-group (Decorative classes) is in preparation.

Color class name or number ..... Exhibitor's No. .....

Flower Type .....

Character scored:	Method of Rating:	Possible score:
Color & texture	No flower of inferior color to be considered; the full 50 points to be deducted for major color defects; dark green in combination with medium and dark red is especially objectionable.	50
Form	Rating should be based on conformity to one of the eight recognized types	15
Size	Except in the case of Elegans types A and B, the following shall rule (diameter across face): 6″ to 7″, allow 10 points; above 7″ to 9″, allow 13 points; above 9″ allow 15 points.	15

Habit	For Elegans types A and B the drooping habit is normal and should not be penalized; but for Reginae, Leopoldii, Orchid and Double types the horizontal, and slightly erect carriage are to be favored, although very slight drooping is allowable.	5
Number of flowers to scape	For less than 3 or more than 5 allow 3 points; for 3 to 5 allow 5 points.	5
Length of scape	The length of scape should be considered in relation to size of flower; scapes too short or too long should be penalized.	5
Character of scape	Scopes should not be too coarse as to be conspicuous, but should be sturdy enough to hold up flower well.	3
Fragrance	Should not be too faint or too strong.	2
	TOTAL	100

DOUBLE AMARYLLIS

HAMILTON P. TRAUB, *Maryland*

There has been renewed interest in double *Amaryllis* in recent years which makes it desirable to use the correct names for these forms. Unfortunately the identity of the double form of *Amaryllis Reginae* L.—*Amaryllis Alberti* Lem.—has been somewhat confused in horticultural catalogs. The subordinate status of this double form has been indicated on page 121, AMARYLLIDACEAE: TRIBE AMARYLLEAE, by Traub & Moldenke, 1949. Now that this double form will be frequently referred to, it is in order to make the appropriate new combination—

Amaryllis Reginae L. var. **Alberti** (Lem.) Traub, **comb. nov.** Syn.—*Amaryllis Alberti* Lem., in L'Illus. Hort. 13: pl. 498. 1866; Traub & Moldenke, Tribe Amaryll. p. 121. 1949. It is illustrated as a double scarlet-flowered form, but the absence of a long narrow tepaltube indicates that it is not closely allied with *Amaryllis belladonna* L., and apparently belongs with *Amaryllis Reginae* as indicated by Baker (Amaryll. 49. 1888). It was obtained from the Finca Esperanza, near Matanzas, Cuba in the early 1860's. (Figure 19)

In 1846 Morren figured *Amaryllis Lowii* (= **xAmaryllis Lowii** Morren. in Ann. Soc. Agr. et Bot. Gand. Jour. D'Hort. 2: 141, pl. 62. 1846; Traub & Moldenke, Tribe Amaryll. p. 137. 1949). It is described as a beautiful semi-double hybrid clone of unknown parentage obtained from the West Indies. The perigone is illustrated as pink, slightly tinged purplish, with yellowish center; the pistil is shown as fully formed with capitate stigma. This is by far the finest illustration of a double *Amaryllis* yet seen by the writer. The umbel is indicated as 1-flowered. It was introduced into Belgium in 1844.

Another double *Amaryllis*, now known as *Amaryllis belladonna* var. *semiplena* (Herb.) Traub & Moldenke, Tribe Amaryll. p. 124. 1949, is apparently not in cultivation today. The flowers are described as semi-double, and its range is indicated as Cuba and the Bahama Islands.

The reader is referred to the article on the McCann double *Amaryllis* by E. J. McCann which appears elsewhere in this issue. This is the only double strain available in the trade today.

COLLECTING AMARYLLIDS IN SOUTH AMERICA

MULFORD B. FOSTER, *Florida*

I often wish that Amaryllids did not interest me so much. I go to collect bromeliads and come back with bromeliads, amaryllids and aroids in spite of my resolution to collect the bromels only.

Fig. 6. *Amaryllis Blumenavia* in its native habitat, Santa Catharina, Brazil, Oct. 1948. Photo by M. B. Foster.

On my most recent trip, the last three months of 1948, I brought back more amaryllids than ever, most of them from Brazil.

One amaryllis which I have always wanted to possess was the white form of *Amaryllis belladonna* Linn., which has now received its final name, I hope, *A. belladonna* var. *barbata* (Figure 15), as listed by Traub and Moldenke in the latest on Amaryllidaceae. My wish came true when I found it growing in Dutch Guiana. It is still a rare *Amaryllis*,

Fig. 7. *Amaryllis Mucsseriana* in its native habitat, Bahia, Brazil, 1948. Photo by M. B. Foster.

but so beautiful that much effort should be made to have it in every collection.

I also found three different phases of the red *A. belladonna* there and when I discovered them growing in old shell mounds I was quite surprised.

The variations are quite worth while and all of them, I think, surpass the form (var. *major*) so common everywhere in Florida. One advantage, too, is that these collected bulbs will set seed, in fact, I already

Fig. 8. Dr. Rietman holding plant of *Amaryllis Muesseriana*, showing height. Photo by M. B. Foster.

have seeds from some of them that flowered six months after they were planted in our garden.

While in Bahia, Brazil, I found the tallest *Amaryllis* that I have ever seen, the peduncle being 36 to 48 inches high (Figure 6). Dr. Traub

has identified this as the long lost *Amaryllis Mussetiana*. It was growing in the caatinga along with the bromeliads and cacti in a wild, harsh section with acid soil. As shown in the photo (Figure 7) the stamens are exceptionally long. The head of six salmon colored flowers with slightly greenish-yellow corona made quite a show.

Here also, I found two more *Habranthus* that were new to me.

In southern Brazil, down in Santa Catarina, I was rewarded with the great thrill of finding the rare *Amaryllis blumenavia* (Figure 8). Years ago it was classed as *Griffinia*. It was in a rather rich, moist section both in the forest and on the meadow edging the forest. Evidently it prefers rather moist conditions. With an umbel of 6 to 8 flowers, white, streaked with pale rose, this cheerful *Amaryllis* surely must come back to our collections. It is a small plant, only 6 to 8 inches high, but nevertheless a very worth while subject. It has already flowered and seeded since my return. The seeds are considerably fuller than most of the *Amaryllis* species but not round and succulent as those of *A. reticulata var. striatifolia*. The seeds of this latter species do not have any appendage or wing at all.

Once again, in Brazil, I saw *Amaryllis* growing in the trees, just as I found them in 1939 and 1940. These same species will grow in the ground but seem quite as happy in the crotches of a tree in the jungle. This rich red flower with the clear transparent green throat makes a beautiful *Amaryllis,* I think.

In Bolivia, I collected several species of Amaryllids but the only one so far that has been identified is *Lepidopharynx deflexa*. I must have taken this interesting species just at the time Dr. Traub's new book was on the press, and he was then making the statement that someone should collect it again so that we might have fresh specimens. That wish has been realized; also I have living material in my collection. One could hardly call *Lepiodopharynx* a beautiful flower. At first I thought it might be another species of *Sprekelia* as it does somewhat resemble that genus. A reproduced drawing of *L. deflexa* appears in Traub and Moldenke's book *Amaryllidaceae*, p. 16.

My quest took me to Ecuador, after a very short stay in Peru, and as in Colombia, I found there *Phaedranasa*. While the flowers are not large their drooping crimson red blossoms are really enchanting. The pistil and stamens extend an inch or more below the tubular flowers giving them an almost fuchsia-like appearance.

In 1946, when in Colombia, I had found *P. Lehmanni* on the western slopes of the Andes in the souther regions of that beautiful country. Incidentally, I met both son and grandson of the old collector, F. C. Lehmann, who lived in Popyan. There we had the privilege of seeing much of his old herbarium and collection of botanical books still owned by Lehmann's son.

In the Popyan and Pasto region it is not uncommon to find rather large colonies of *Eucharis subendendata*. This is a very lovely small white *Eucharis*, apparently excellent for commercial use, and certainly a little gem for the amaryllid enthusiast. It has stood the test of over

two years in our garden without special care along with the "garden run" of amaryllids.

There are, of course, many more interesting oddities in this large family to be found in South America, some that have much merit, species that were first collected almost a century ago and many that have not yet been discovered by the collector who is willing to take the thrilling inconveniences for those who wait patiently at home hoping to have one of the first ones in their collection.

ZEPHYRANTHES ALBIELLA

HAMILTON P. TRAUB, *Maryland*

In 1945, Dr. Paul Epple, of Bogota, Colombia, sent bulbs of a *Zephyranthes* species for the Society's trial collection. When the plant flowered in 1949, it proved to be new to science.

Zephyranthes albiella Traub, **sp. nov.** [Plate 6]

Herba bulbosa; bulba parva; foliis linearibus usque ad 8 cm. longis cum floribus a vere usque ad auctumnum exhibentibus; pedunculo sub anthesin 8 cm. longo, in statu fructifero usque ad 20 cm. longo; dimidio inferiore spathae 1.7—2.1 cm. longae connato; dimidio superiore bifido; pediculo sub anthesin 1.6—2.7 cm. longo, in statu fructifero 4 cm. longo; flore leviter declinato; perigonio 3—3.5 cm. longo; tubo tepalorum 3 mm. longo, segmentis lanceolatis 2.8—2.9 cm. longis, 6.5—7.5 mm. latis, praeter basim subviridem albis; staminibus 3 longioribus ca. 2.1 cm. longis, 3 brevioribus ca. 1.4 cm. longis; stylo quam segmentis tepalorum leviter breviore; stigmate trifido, lobis 2—3 mm. longis; seminibus per loculo 1—3. Exemplum typicum: Traub Herb. 41; tabula typica Pl. 6.

Bulb small; leaves contemporary with the flowers (evergreen under greenhouse culture), green, linear, channeled down the face, up to 8 cm. long; peduncle at anthesis 8 cm. tall, elongating up to 20 cm. in fruit, somewhat flattened, about 3—4 mm. in diam.; spathe united in lower half, whitish and changing to dry-papery in fruit, 1.7—2.1 cm. long, the bifid segments opposite or to one side; pedicel 1.6—2.7 cm. long, 1.5—2 mm. wide, elongating up to 4 cm. in fruit, whitish at first, changing to light green on following day; flower held slightly declinate as shown in the type illustration (Plate 6); ovary 3-celled, 1.5—2 mm. in diam., greenish-whitish, changing to green in fruit; perigone 3—3.5 cm. long, wide open as shown in the type illustration (Plate 6) by the middle of the first day (2.5 cm. long, 4.3 cm. in diam. across face), thereafter the six tepalsegs are somewhat connivent; tepaltube greenish, 3 mm. long; paraperigone apparently absent; tepalsegs lanceolate, 2.8—2.9 cm. long, 6.5—7.5 mm. broad, greenish at the base, otherwise pure white; stamens attached at the mouth of the tepaltube, white, the three longer about ¾, and the three shorter ½ as long as the tepalsegs; anthers versatile, yel-

Zephyranthes albiella Traub, *sp. nov.*

Plate 6

low; style white, slightly shorter than the tepalsegs; stigma trifid, lobes about 2—3 mm. long; stamens and style exserted when perigone is wide open as shown in the type illustration (Plate 6); fruit a 3-celled loculicidally dehiscing capsule, 8 x 8 mm.; seeds 1—3 per locule, 7 x 5 mm., black. Type specimen: Traub Herbarium no. 41.

Range.—Colombia: Bogota, intermediate region.

Notes.—This is a little fairy-like species as shown in the type illustration (Plate 6), which springs into flower rapidly at intervals from spring to autumn to gladden the beholder. Its name appropriately signifies "little whitey." Under culture the plant thrives in neutral and acid soils, but lingers on without flowering in alkaline soils. *Zephyranthes albiella* apparently belongs in the section which includes *Zephyranthes rosea* (Cuba), but it is quite distinct.

×CYRTANTHUS HENRYAE

Hamilton P. Traub, *Maryland*

Elsewhere in this issue Mrs. Henry records the history of a number of *Cyrtanthus* hybrids. The type description of one of these hybrids which is of scientific interest from the standpoint of experimental biosystematics, and also as a worthy addition to our window gardens in the north, and outdoor gardens in the subtropics. It has been named in honor of the originator, Mrs. J. Norman Henry, Research Associate in Botany, The Academy of Natural Sciences of Philadelphia, and recipient of the 1950 Herbert Medal.

×Cyrtanthus Henryae Traub **hybr. nov.** [Fig. 9]

Planta inter [(*C. MacKenii* × *C. MacKenni* var. *Cooperi*) × *C. "flammeus"*] (parens foemina) et *C. sanguineus* (parens masculus) hybrida; foliis 3—5, 3.8—5.5 dm. longis, ad mediam 1.7 cm. latis, ad basim usque ad 6 mm. angustatis, apicem praeacutum versus 7 mm. angustatis; pedunculo 3.3—4 dm. alto, ad basim 1.2 cm. diametro, ad apicem 8 mm. diametro; spatha bivalvata, valvis lanceopatis 4—9 cm. longis; umbella 6—9-flora; pedicellis 2.5—7 cm. longis; perigonio 6—6.5 cm. longo puniceo (sicut *Cancer pagurus* L. exhibens), ad corallinipuniceo denique commutente; tubo tepalorum 4.5 cm. longo, segmentis ovali-obtusis 2 cm. longis, 1.2 cm. latis; staminibus tribus 6 mm. tribus 9 mm. infra apicem tubi tepalorum insertis; filamentis 3—4 mm. longis; stylo quam limbo perigonii breviore; stigmate trifido. Exemplus typicum: Traub Herb. 83; tabula typica Fig. 9.

Type Description.—A hybrid, [(*C. MacKenii* (white) × *C. Mackenii* var. *Cooperi* R. A. Dyer (yellow)) × *C. "flammeus"*], (seed parent) × *C. sanguineus* (Lindl.) Hook. (pollen parent). Rootstock a tunicated bulb; leaves 5, nearly petiolate but not exactly so, 3.8—5.5 dm.

long, 6 mm. wide at base, enlarging to 1.7 cm. at widest part, narrowing to 7 mm. near the pointed apex, near to but not exactly spinach green

Fig. 9. *xCyrtanthus Henryae* Traub, *hybr. nov.* Photo by Josephine deN. Henry.

(RHS-0960/1) in color, with very slight bloom; peduncle 3.3—4 dm. tall, flattened, edges rounded, 1.2 cm. in diam. at base, narrowed to 8 mm. at

apex, light green with prominent bloom; spathe 2-valved, valves lanceolate, 1 cm. wide at base, 4—9 cm. long; bracteoles much smaller; umbel 3—10 flowered, pedicels 2.5—7 cm. long; ovary 7 mm. long; flowers long lasting; perigone of typical *Cyrtanthus* shape, 6—6.7 cm. long, 3.5—4 cm. in diam. at apex of perigone limb, shrimp red (RHS-616) on opening, changing to a clear coral pink (RHS-0619/1) after a few days, and thus there may be flowers of at least three distinct color shades on the plant at the same time; telaptube 4.5 cm. long, 3 mm. at base, enlarging to 12 mm. at apex; tepalsegs 2 cm. long, 1.1—1.2 cm. wide, oval-obtuse, sometimes somewhat spatulate; stamens attached in two rows, one 6 mm. and the other 9 mm. below apex of tepaltube, filaments 3 mm. long; style shorter than the perigone limb, stagma trifid. Type specimen: Traub Herbarium no. 83, *xCyrtanthus Henryae* clone WILLIAM PENN (described elsewhere in this issue); type illustration, Figure 9.

NOTES.—This fine plant is easily grown as a pot plant, and increases rapidly by offsets. It blooms at intervals throughout the year. The 6—9-flowered clone represented by the type specimen, Traub Herbarium no. 83, has been named WILLIAM PENN.

GOOD DAYLILIES

GEORGE GILMER, *Virginia*

Each year I now try to add some forty to fifty new daylilies to my collection. About half of these are current introductions and the other half recent introductions that are highly recommended. Few men have either the money or land or labor to test some three hundred new introductions annually.

C. W. Culpepper has introduced four and these are all excellent. Russell has introduced over seven hundred varieties and Mrs. Nesmith is runner-up. I have only tried a small proportion of their introductions. I have grown nearly all of some fifty varieties of Stout's, practically all of Traub's and some from many other hybridizers.

To make room for new varieties I try annually to discontinue at least as many as the new ones acquired, but the number being grown gradually increases. Most of them are so good it is hard to let them go. If half of those acquired any year are good enough to displace older ones I am well pleased with that year's selections. After a careful test of at least two years, about half the new ones are discontinued. The others are divided and replanted. I try to grow a solid bed of each of the one hundred best. It is very difficult to keep the list down to the one hundred. There are introductions from more than a score of hybridizers in my garden so the work of the different growers can be compared. If blooms fade in the afternoon plants are generally discontinued except in pink and purplish shades. Most plants that do not have good foliage throughout the entire growing season are discontinued.

There have been nearly three thousand named varieties introduced, so that there is little use to mention those I have discontinued. It would

be a too small a proportion of the whole. My list of varieties changes considerably from year to year. My 1949 list is as follows:

OLD VARIETIES

Most of the old varieties have been superseded by recent introductions. There are some that are still good even in comparison with the latest. They are generally cheap and abundant.

Gold Dust,—fair, very early yellow; Apricot,—fair, early yellow; Semperflorens, — rather early, excellent; Waubun, — early midseason, with long twisted petals, yellow, excellent; Patricia,—midseason, excellent; Dauntless, — yellow, with touch of red, excellent; Rajah and Macaulata, — good midseason, red and yellow; Dorothy McDade and August Pioneer,—good, late yellows; Chengtu,—good, late red and yellow; Hankow,—good, late yellow and red; and Autumn Prince,—fair, very late yellow, small and not as good as the early ones.

EARLY VARIETIES

All the good early ones I have are yellow, or some shade of yellow. Earlyanna; Early Bird; Elizabeth; Betty; and Judge Orr.

MIDSEASON VARIETIES—YELLOW

Adventure,—excellent; Albedo; Annis Victoria Russell; Big Glory; Chrome Orange,—Sungold is similar and a little better; Gold Empire; Gold Orchid; Golden Triangle,—a distinctly different shape; Havilah; Herkimer Johnson; Hesperides; Hesperus; Iowa; Johanna Hutchins; John Blazer,—does best on mature plants; Lidice,—small orange, one of my favorites; Manchu; Moon Goddess; Patricia; Purity; Queen of Conzales; Revolute,—excellent; Sungold; and Susanna.

REDS

Acceptor; Berwyn; Black Falcon,—excellent in the morning, but fades badly; Black Prince and Mykewa,—both good dark reds but are so similar only one should be grown; Blanche Hooker; Fire Red; General McArthur,—brilliant; Granada; Indian Chief; Kinglet; Krishna,—purple in the morning, fades to red; Matador; Mrs. John J. Tigert; Papagaio; Peony Red,—unusual shade, fades a little; Red Bird; Ruby Supreme; San Juan; Seminole Chief; Stephen Foster; Warpath; and Wekiwa,—beautiful in the setting sun.

NEAR PURPLES

Krishna, — fades, but attractive after fading; Potentate, — fades much; Purple Water, and The Sultan,—fades.

PINKS

Bertrand Farr,—fades some; Clarion,—one of the best; Georgia,—large, late, excellent bloom, poor foliage; Helen Wheeler,—my favorite pink; Lustrious,—fades; Pink Charm,—fades; Pink Luster,—fades; Rosalind,—fades some; and Sweetbriar,—fades.

BLENDS AND BICOLORS

Aladdin; Am,—very tall, bicolor; Anna Zenger; Aurantiaca; Ballet Girl,—striped; Bicolor; Bright Eye; Carnival; Clarice; Dauntless; Decoration; Dr. Stout,—excellent, never hurt by sun; Emberglow; Garden Lady; George Kelso,—grows in full sun; Glowing Embers; Inca Gold; Mayor Starzynski; Meteor; Mikado; Miss Jennie; Mitra; Queen Wilhelmina; Rajah; Reba Cooper; Reinbeck,—fades a little; Santa Maria; Stalwart; and Victory Montevideo.

LATE

August Pioneer; August Orange; Aztec Gold; Chengtu; Dorothy McDade; Hankow; Sulin; Autumn Prince,—latest but not good.

LONG TWISTED PETALS

Fantasia; Silver Stars; Taruga; Theodore Mead; and Wau Bun.

TRIANGULAR SHAPE BLOOMS

Golden Triangle,—excellent.

TALL

Massaoit; Plume Rouge; and Am.

SMALL

Mignon; and Autumn Prince.

PHOTOGRAPHING HEMEROCALLIS IN COLOR

Philip G. Corliss, *Somerton, Arizona*

There is, to my knowledge, no flower which lends itself so well to color photography as the *Hemerocallis*. At the outset, let me say that all of my remarks henceforth are based on the use of Kodachrome, as I have found it superior, at least in my hands, to any other color emulsion.

With correct lighting and exposure, the colors of the daylily are faithfully reproduced in color photography. No delicacy of shading is lost, and the reflected and transmitted light which is so wonderful in this flower, actually tends perhaps to exaggerate the beauty of the color.

The nature of the growth of the *Hemerocallis* makes it an ideal flower to work with in the garden. It normally tries to face directly into the sun. It grows on a long bloom stalk which may easily be bent to the desired position and held with a plant prop. It is noted for its tidiness in droppig its old blooms, which means that usually only the attractive buds will accompany the flower in the picture. Except with varieties of *H. multiflora* parentage, there is normally only one open bloom on the stalk, thus assuring a clear portrait.

Kodachrome movies, and stills taken at medium distance are excellent, and if you haven't tried them, by all means do so. But flower por-

traiture is especially easy with this flower. The portraits may be taken with any of the cameras using the 35 mm. film, but great practice may be necessary to assure both perfect focus and centering, unless a camera with a ground glass focus is used. I recommend for this purpose either the Kodak "precision Enlarger" or a Recomar "18" with a 35 mm.. Back Adapter. Of course, the larger cameras, such as the Graphics, also have ground glass focus, but they use cut film which will run your expense much higher, although the resultant 35 mm., slides made from the larger film may be of better quality, and may be masked to suit your wishes.

For a portable background, easily rolled up and stored in the trunk of the car, I use what I call my "invention." I have fastened onto a common yardstick (handy for measuring distance) a piece of an old dark blue "carriage robe" which is backed with some gold cloth that came off of our sofa when it was recovered. The gold side is used only for flowers not contrasting with the blue background. A brass rod, for weight, is sewed into the bottom of this cloth. The whole contraption is supported in the field on a collapsible music stand.

A tip: Carry a good notebook, and record each picture in numerical sequence. When I start a new roll of film, I number it by the day of the month. Thus, if I start a roll on the 12th, that film is number 12-1. If I finish it and start another that day, the new roll is 12-2, even though I do not finish it that day. When the films are sent in for processing, I put the number before or after my name on the yellow label which the laboratory uses to mail back your film. Incidentally, be sure to write your name and address in your notebook, in case it is mislaid!

Occasionally the laboratory sends back the mounted slides with the numbers wrong or entirely missing, so it's a good idea to write a short description of each shot, as you record it in your notebook. This is also helpful if you make some mistakes yourself, such as double exposures, accidental exposure to light, etc. . . . Mr. Eastman, where's my bonus?

OBSERVATIONS OF A DAYLILY HOBBYIST

Everett H. Kennell, *New York*

I have grown *Hemerocallis* some twelve years. My first daylilies included Apricot, Goldent, Estmere, Winsome, J. A. Crawford, Hyperion, and Margaret Perry. Each year I have added others to total more than one hundred varieties. These have been chosen with the thought of producing new daylilies in my garden. Early crosses produced mostly yellows and an occasional fulvous type. Some found to be good parents are Hyperion, Lady Hesketh, Wau-Bun, Serenade, Persian Princess, Theron and Soudan. Many of the new reds including Ruby Supreme are now being used.

Each amateur and breeder has a definite ideal in choosing daylilies to be crossed. It is best to observe hundreds of daylilies before making

selections. To me the choice of parent stock is a very personal problem. Seedlings of most daylilies will produce something appealing to the imagination of breeders.

In my breeding the three categories of crosses are—named varieties are crossed, named varieties are crossed with my choice seedlings, my best seedlings are crossed. Seedlings from 1948 crosses, now growing in my garden are mostly crosses between my own hybrids. This spring seed was planted in the open April 4, and observation some eight weeks later would indicate the possibility of some bloom from these crosses in 1950.

It may be of interest to indicate here just a few seedlings which merit mentioning, and also to note a few crosses which have produced excellent progeny for further breeding.

Seedling No. 46-16. A clear lemon yellow self much the color of MODESTY. Produces up to 47 blooms on a well branched scape, above excellent dark green foliage. Blooms over a period of six weeks. Seedling No. 46-16.5. A sister seedling to the above, having like characteristics. Blossom clear orange yellow self. As large or larger than MONGOL. Seedling No. 46-1. A very unusual pastel. Petals have wavy margins. Many blossoms on scape similar to SERENADE. Many visitors have indicated this as a very unusual daylily. Seedling No. 45-182. A very lovely huge pale lemon trumpet. Complex parentage includes HYPERION, LADY HESKETH, and SUNNY WEST. Seedling No. 48-3. Rather complex parentage. This is a much better THERON. Larger, broader petals, better substance. Seedling No. 49-3. First bloom small but much the best pink I have yet seen. Pollen parent was ROSALIND. Seedling No. 46-64. A cross between SOUDAN and SERENADE. A pastel bicolor which blooms from mid-June to late August by continuously sending up new scapes. I am using this one for further breeding.

A number of crosses using *H. flava* as pollen parent have been made in hopes of getting better fragrant early daylilies. A cross between FLORHAM and *H. flava* produced some twenty-three seedlings, all lemon or orange in color and all fragrant. These are being used for further breeding.

A cross between MARGARET PERRY and HYPERION produced only three seed and only one plant. This was a definite apricot in color and very late blooming. This does not set seed and pollen seems somewhat sterile. I did get a cross using this pollen on a recurrent bloom of MIKADO. This produced only four seed and but one plant. This bloomed first in late June 1949. A gorgeous sunburst of HYPERION type, worthy of very careful observation. This may emphasize the wisdom of observing the unusual in plant breeding.

This little article is indicative of my enthusiasm for daylilies.

AMARYLLID NOTES

Hamilton P. Traub, *Maryland*

Amaryllis lateritia Dietrich, Allg. Gartenz. 18: 65—66. 1850; Traub & Moldenke, Tribe Amaryll. 1949, p. 137.

Description.—Rootstock a bulb; leaves bright green, beginning to form when flowers are at anthesis, judging from their shape at the immature height of about 2.5 cm., they will apparently be strap-shaped to lanceolate (lanceolate-lorate) when fully developed; scape 6.1 dm. tall, bluish-green, round, tubular, about the thickness of a little (weak) finger, not perceptibly narrowed toward the apex; umbel 2-flowered; spathe 2-valved, valves 2.5 cm. long, turned back, green, tinged reddish, oblong, torn at the apex, and membranous; bracteoles greenish-white, filiform; petioles 2.5 cm. long or slightly longer, green, slightly tinged reddish; ovary 8—9 mm. long, three-lobed, green; flowers held horizontally; perigone tubular-funnel-shaped, light to bright brick-red; tepaltube very narrow, 3-sided, 3.8 cm. long, slightly arched and incurved [gekruemmt] toward the apex; limb 7.6 cm. long, 6-parted; the 3 setepalsegs broadest, oblong, 3.8 cm. broad, whitish at the tips; petepalsegs narrower, lanceolate, 1.7 cm. broad, obtuse or blunt at the tips; all tepalsegs somewhat undulate at the margins, and greenish-white at the base at the union with the tepaltube; throat naked [paraperigone absent]; stamens upright, shorter than the tepalsegs; anthers reddish-whitish-yellow; pistil brick-red, as long as the stamens, stigma small, obscurely trilobed, lobes rounded; capsule and seeds unknown.

Range.—Upper Guinea.

Notes.—Brought back to Germany in November 1849 from Upper Guinea by Dr. Halleur, a missionary. Flowered in April-March 1950. Dietrich (1850) was not certain as to its affinities, stating that apparently it was intermediate between the *Vallotae* and *Amaryllides*, but might belong to either one of them.

This plant was overlooked by Baker (1888) and subsequent workers. It is hoped that new material can be collected for further study.

Zephyranthes Hassleriana (Chodat et Lendner) Traub, **comb. nov.** Syn.—*Amaryllis Hassleriana* Chodat et Lendner, in Bull. L'Herb. Boiss. Ser. II, *1:* 422. 1901. (Paraguay); Traub & Moldenke, Tribe Amaryll. 137. 1949; Moldenke, Plant Life *5:* 84. 1949.

Habranthus caeruleus (Grisebach) Traub, **comb. nov.** Syn.—*Amaryllis caerulea* Grisebach, Goett. Abh. Wiss. Ges. *24:* 320. 1879; Traub & Moldenke, Tribe Amaryll. 137. 1949; Moldenke, Plant Life *5:* 84-85. 1949; *Zephyranthes caerulea* (Grisebach) Baker, Amaryll. 37. 1888; *Habranthus caeruleus* Baker, Amaryll. 211 (Index). 1888, nomen.

xAmaryllis Johnsonii Lodd., Bot. Cab. 159; Sweet, Hort. Brit. 402. 1827; Herb. Amaryll. 142. 1837; Traub & Moldenke, Tribe Amaryll. 136. 1949. Syn.—*xAmaryllis brasiliensis* Red. Lil. 8. 469; *xAmaryllis Carnarvonii* de Candolle, Pl. Rar. Hort. Genev. pl. 9. (This bibliography is given for the benefit of those who may wish to follow up this subject.)

Eustephia yuyuyensis Hort. (err. *yuyuensis*). The editor has received an article on the above subject and has been attempting to trace its history. Any information as to place of first publication will be appreciated. The name is apparently derived from the name of the Province of Yuyuy in Argentina.

With reference to this plant, Mr. Th. Hoog, Haarlem, Holland, writes under date of Jan. 9, 1950, that it was distributed by the son of Mr. Harry Blossfeld, of Potsdam, Germany, at the same time as *Amaryllis immaculata* Traub & Moldenke (syn.—*Hippeastrum candidum* Stapf).

Hymenocallis narcissiflora (Jacq.) Macbride, in Publ. Field. Mus. Nat. Hist. Chicago, Bot. Ser. XI. 1931, p. 11. (Syn.—*Pancratium narcissiflorum* Jacq., Fragm. Bot. 68. 1809: *Pancratium calathiforme* Red. Lil. 59: pl. 352. 1812; *Pancratium calathinum* Ker-Gawl. in Bot. Reg. pl. 215.; *Ismene calathina* Herb. Append. Bot. Reg. 46. 1821; *Ismene calathiformis* M. Roem. Syn. Ensat. 186. 1847; *Ismene Tagliabuei* M. Roem. Syn. Ensat. 186. 1847; *Ismene narcissiflora* M. Roem. Syn. Ensat. 186. 1847; *Hymenocallis calathina* Nichols., Dict. Gard. 2: 165.)

This widely cultivated plant is usually listed incorrectly as either *Ismene calathina* Herb. or *Hymenocallis calathina* Nichols. It is hoped that the correct name, *Hymenocallis narcissiflora* (Jacq.) McBride, may be standardized in usage as soon as practicable.

Brunsvigia rosea var. **longipetala** (Lem.) Traub, **comb. nov.** Syn.—*Amaryllis longipetala* Lem., L'Illus. Hort. 13: 78—79. 1866; Traub & Moldenke, Tribe Amaryll. 137. 1949.

This is a tri-colored variety—flowers yellowish at the throat and exterior base, changing to white and delicate rose toward the apex—with relatively long tepalsegs. It was discovered in South Africa by the Dutch botanist, Vroom, and was described by Lemaire in 1866.

Eustephia coccinea Cav., Ramon Ferreyra no. 3775, collected between Tarma and Carpapata, Province of Tarma, Dept. Junin, Peru, in stony ground, at alt. 2600—2800 m., June 28, 1948, is apparently a more robust 8—12-flowered form with longer pedicels, slightly shorter perigone, and filaments petaloid in lower 2/3—pedicels variable up to 6 cm. long; ovary 3—6 mm. long; perigone above ovary, 2.5—3 cm. long, "red with green apex"; tepaltube 5 mm. long; tepalsegs 2.5—3 cm. long; filaments free, petaloid in lower 2/3, toothed on each side; style exserted, stigma capitate (obscurely trilobed).

Hymenocallis amancaes (Ruiz et Pav.) Nichols.; Ramon Ferreyra no. 6153, collected at Atocongo, about 25 km. south of Lima, Dept. Lima, Peru, on stony soil, alt. 250—300 m., July 17, 1949.

Amaryllis Ferreyrae Traub, **sp. nov.** Hera bulbosa; cervice bulbi brevi 2 cm. longa; foliis 3 vel 4 cum floribus mensi septembri (in Peruvia) productis usque ad 55 cm. longis, medio 3 cm. latis, ad apicem lorato-lanceolato-acutis, usque ad 6 mm. ad basin angustatis; pedunculo 15—19 cm. alto, ad basin ca. 1.5 cm. diametro, ad apicem 4—5 mm. diametro; umbella biflora; spatha 2-valvata, valvis usque ad basin distinctis lanceolatis 6 cm. longis; pedicellis 8—9.5 cm. longis; ovario 10 mm. longo, 6 mm. lato; perigonio valde patenti rubro; tubo tepalorum gracili 2.5 cm. longi; paraperigonio nullo; limbo perigonii 6-segmentato, segmentis 9 cm. longis, medio 3—4 cm. latis, ad apicem acutis; staminibus ad oram tubi tepalorum adnatis ca. 6.5 cm. longis sed longitudine inter se series 4 gerentibus, stylo brevioribus declinato-adscendentibus; stylo declinato-adscendenti segmentis tepalorum breviore; antheris 7 mm. longis; stigmate plano summitate triangulari. Exemplar typicum: Ferreyra 4997, herb. Traubi access. nos. 111 et 112.

Bulb with a short neck, 2 cm. long; leaves 3—4, contemporary with the flowers in September (Peru), to 55 cm. long, 3 cm. at the middle, lorate-lanceolate-acute above, narrowed to 6 mm. at the base; peduncle 15—19 cm. tall, about 1.5 cm. in diameter at the base, 4—5 mm. at the apex; umbel 2-flowered; spathe 2-valved, valves free to the base, lanceolate, 6 cm. long; pedicels 8—9.5 cm. long; ovary 10 mm. long, 6 mm. wide; perigone wide open, red; tepaltube slender, 2.5 cm. long; paraperigone absent; the perigone-limb of 6 tepalsegs 9 cm. long, tepalsegs 3—4 cm. wide at the middle, pointed at the apex; the 6 stamens of 4 sets of lengths, attached at the mouth of the tepaltube, 6.5 cm. long, slightly shorter than the style which is shorter than the tepalsegs; stamens and syle declinate-ascending; anthers 7 mm. long; stigma flat, triangular on top. Type specimen Ferreyra 4997, accession in Traub Herbarium nos. 111—112. Collected by Dr. Ramón Ferreyra on the Isla Santa Maria, near Yurimaguas, Huallaga Valley, Dept. Loreto, Peru, alt. 150—200 m. in the forest, Sept. 16, 1948.

Notes.—This fine species belongs in the Subgenus *Aschamia*. It differs from *Amaryllis Leopoldii* in color pattern of the flower, and in having less regular tepalsegs, and shorter stamens and style, and from *Amaryllis Reginae* in having leaves fully developed with the flowers, spathe-valves shorter than the pedicels, a longer tepaltube, and a style shorter than the tepalsegs. *Amaryllis Ferreyrae* will represent a fine addition to the germ plasm collection of the *Amaryllis* breeder. It is named in honor of Dr. Ramón Ferreyra.

[TRAUB—AMARYLLID NOTES, CONTINUED ON PAGE 95.]

A REVIEW OF THE GENUS **BRUNSVIGIA**

R. A. Dyer

INTRODUCTION

As in the case of my account of the genus *Cyrtanthus* in Herbertia, 1939, this work on the genus *Brunsvigia* is given the status of a Review. It does not merit the title of Monograph. The work has suffered many interruptions and there is wide scope for further research and study of living material, especially in the field. But for all the defects a considerable amount of new information has come to light, which justifies publication.

I wish to thank various collaborators and members of the staff of the Division of Botany and Plant Pathology for assistance both in the herbarium and in the field. Their names appear in the text without further thanks. I am very grateful also to the Curators of the various Herbaria in the Union of South Africa for the generous loan of herbarium material, without which it would not have been possible to carry out the work. From Kew I had the loan of a few important specimens.

The plant which Heister gave the name *Brunsvigia* in 1753 [Fig. 10], in honour of the Duke of Brunswick, a German general, has an interesting history. The bulb was sent from the Cape by Governor Ryk van Tulbagh, in 1748, to von Imhoff in Germany, Director of Mines and a promoter of science. The plant was 7 months on its journey via Holland, but survived to flower for the first time in 1750. Heister regarded it as a miracle of the plant kingdom and described it in great detail, without, however, giving it a specific name.

A plant, now regarded as conspecific with Heister's specimen, was described, also in 1753, by Linnaeus, who used the binomial *Amaryllis orientalis*. For a considerable period Heister's publication was either overlooked or ignored.

As will be seen from the little synonymy which is cited, species now classified under *Brunsvigia* have had a checkered career. For instance Thunberg, in 1795 and 1823, had them in the genus *Haemanthus*. Jacquin, in 1797, followed Linnaeus by including the 3 species he figured in the genus *Amaryllis*. (His illustrations are botanical works of art.)

Aiton, in 1811, adopted Heister's genus *Brunsvigia* and transferred to it the species figured by Jacquin as *Amaryllis multiflora*, *A. marginata*, *A. radula*, and *A. striata*. *A. marginata*, however, has since then generally been placed under *Nerine*, but it certainly shows a strong affinity with *Brunsvigia* and gives the impression of being a connecting link between the two genera. For this reason Jacquin's illustration is reproduced with a description. The capsule is more like that of typical *Brunsvigia* than *Nerine*, whereas the perianth has differences which are not readily put into words, since there is already considerable variation among the recognised species of *Brunsvigia*.

In 1822 Herbert, in an article on the culture of the Guernsey Lily

and other bulbs of the genera *Nerine*, *Coburgia* [Herb. 1819], and *Brunsvigia*, misapplied the name *Brunsvigia* and incorrectly placed the typical species under *Coburgia* [Herb. 1819]. Later Herbert, 1837, while recognising the typical *Brunsvigia* correctly, excluded the species now known as *B. josephinae* and *B. grandiflora*.

In attempting to classify the species of *Brunsvigia* according to their interspecific relationship, two main alternatives present themselves as a basis for initial subdivision. Either the character of the leaves and capsules may be used, or that of the flowers, whether fairly regular or zygomorphic. If one follows the latter course, the 2 outstanding species *B. orientalis* and *B. josephinae* come near together, whereas they are well separated if one relies on the characters of the leaves and capsules. In essence this was the question Herbert put to himself in 1837 and answered it by keeping the two species in different genera, *Brunsvigia* and *Amaryllis* [= *Coburgia* Herb. 1819] respectively, saying that he relied for his distinction mainly on the broad recumbent leaves with a cartilaginous margin and the almost winged, triangular capsule of the species he placed in *Brunsvigia*.

Baker in Flora Capensis, 1896, has cited most of the earlier literature of the genus. His monograph contained 11 species, most of which have been retained, although it is considered that his citations of specimens erred in several instances. Species have been added since, Miss Leighton 3, and the total is in the neighbourhood of 20, but still our knowledge of at least half this number is regretfully scanty.

The Cape Belladonna is not dealt with in this review, since South African botanists with whom the question has been raised, agree that it cannot be included with *Brunsvigia* if reliance is placed on the criteria accepted by them and the writer for generic distinctions.[1]

A feature, which has been mis-interpreted before, is the question of the production of the leaves, whether "contemporary with" or "after" the inflorescence. In the summer rainfall areas of the Transvaal and Natal the inflorescence is more or less contemporary with the leaves; that is, the leaves develop in spring or summer and before they mature the inflorescence arises on the *outside* of the new leaf crown, from the axil of a leaf-base of the previous season. As the distribution of the genus extends westwards into the winter rainfall area of the Cape and the dry Karoo, the leaves arise later in the summer or in the winter, while the inflorescences of most species are produced during January to March.

[1]Editorial Note.—Scientific research cannot be regulated in any manner whatever, and Dr. Dyer is privileged to exclude the Cape Belladonna from *Brunsvigia* Heist., on the basis of the criteria accepted by him. Dr. Gouws of the University of Pretoria holds a similar view, and he has proposed the name, *Coburgia rosea* (Lamarck) Gouws (Plant Life 5: 64. 1949) which is the valid name of this species under the International Rules of Botanical Nomenclature if it is maintained as the type of a separate nomenclatural genus (See Traub & Moldenke, Tribe Amaryll. 56, 59—60; 64—67. 1949).

Thus to cite a specific example, the inflorescence of *B. orientalis* is produced about March and the leaves follow later and persist almost throughout the South African winter. In such cases the leaves are said to be produced "after" the inflorescence. But as stated the inflorescence

Fig. 10. *Brunsvigia* Heist. (type) = *B. orientalis* (L.) ex Eckl. Photo copy by H. King.

is produced in the axil of the previous season's leaf, *and it is the inflorescence which is always after the leaf* from whose axil it is produced. The leaves, whether contemporary or "after" the inflorescence, build up reserves for the production of an inflorescence in the season following. In only one single case has an inflorescence been observed to be produced from the axil of a current season's leaf and because of its unique nature

is reproduced in Plate 10. This production of flowers and leaves at different times of the year is one of the main causes of confusion and uncertainty in classification—so few specimens are complete in herbarium collections and collectors' records are hopelessly inadequate.

The *age* of the inflorescence has an important bearing on its appearance. The young inflorescence has the pedicels suberect and as the inflorescence matures the pedicels usually spread more and elongate gradually until the fruiting stage. When the capsules mature, the pedicels become dry and rigid and the peduncle rots away from the bulb at ground level. A light wind at this stage is sufficient to roll the inflorescence over the ground and scatter the seeds. This character is not restricted to *Brunsvigia*, however, for it is seen also in species of *Boophone*. If an inflorescence is picked in the bud stage the flowers are liable to open without the perianth and pedicels developing to their normal size. Such a specimen is very misleading if not fully documented in the herbarium.

The texture of the bulb tunic of different species is also diagnostic. In some species the tunic is built up of thin membranous units, particularly in the group with many leaves per season, whereas in the group with a few spreading leaves per season the tunic is usually hard and cartilaginous. In some of the latter, the cartilaginous thickening is present below the neck of the bulb in the young leaves and sometimes extends in a thin band on the sides of the neck, forming bristles with age. The drying out of the leaf bases with cartilaginous thickening is most irregular and some areas of individual scales become hard and other areas dry-membranous, but the whole effect is a hard brown tunic.

GENERIC DESCRIPTION

Bulb more or less oval, 2—20 cm. in diameter, subterranean or occasionally mainly above ground level, with a membranous or cartilaginous tunic. *Leaves* produced at the same time or "after" the flowers, distichous from the bulb, lorate or ligulate, spreading closely on the ground or at first suberect and only falling to the ground with age, with or without cartilaginous thickening near the neck of the bulb, with close parallel air passages within. *Peduncle* compressed, solid. *Umbel* of 5—75 flowers, spathe-valves 2. *Perianth* zygomorphic or fairly regular, cut down nearly or occasionally quite to the base, usually with a short cylindric tube; lobes subequal, linear-lanceolate, oblanceolate or oblanceolate-oblong. *Stamens* more or less declinate, inserted in the perianth tube; filaments filiform, often in 2 series; anthers oblong, dorsifixed, versatile. *Style* filiform, declinate, with a subcapitate stigma. *Ovary* more or less turbinate, 3-celled; ovules numerous, superposed; capsule turbinate and acutely triquetrous or more or less oval-oblong and not acutely angled, narrowed into the pedicel, loculicidally 3-valved; opening along sutures but sometimes breaking unevenly, seeds subglobose, with a conspicuous funicle.

Distribution: Spreading from the Cape Peninsula into all parts of

Southern Africa, with the greatest concentration in the south and fading out towards the tropics.

SPECIES UNPLACED IN KEY

B. RAUTANENII Baker in Bull. Herb. Boiss. ser. II, 3:667(1902).

Description: *Bulb* unknown. *Leaves* unknown. *Peduncle* 2.5—3 cm. diam. at the apex. *Umbel* 20—30-flowered.

Distribution: South West Africa; Amboland, fr. 5.1.1899, Rautanen.

Notes: With the scanty information supplied it is impossible to place the species in the key. The record, however, will allow future collectors to keep a look out for further specimens in the type locality.

UNCLASSIFIED SPECIMENS

In the key and descriptions which follow an effort has been made to classify the specimens which have come under review, but there are several about which no final decision has been taken. Some are referred to in the notes on their nearest allies, while a few deserve special mention here.

(a) *Riversdale Division:* There are at least 2 species in this area, neither of which is fully collected. One is allied to *B. striata;* and the other (Muir, 4011) is related to *B. grandiflora.*

(b) Drakensberg, Keiber Pass, near Harrismith, O. F. S. This specimen in the National Herbarium, Pretoria, consists merely of two detached leaves and three detached flowers, but the leaf is so much narrower and attenuate (40—50 cm. long, 2—3 cm. broad) that a search in its locality would probably reveal another undescribed species.

There are other specimens in South African herbaria which it has not been possible to identify with certainty, but the impression is that, had fuller information been available, it would have been possible to identify them specifically.

NERINE MARGINATA [PLATE 7]

The mention of this plant in a review of the genus *Brunsvigia* may be questioned, but it exhibits some most interesting characters, which are not typical of *Nerine* and show an affinity with *Brunsvigia.* McOwan, writing a note on a duplicate of his 1552 (= 2994) which he named *Brunsvigia marginata* Ait. (and which Baker placed under *Nerine*) stated that the half-mature capsule was as typically triquetro-turbinate as the most exacting systematist could desire.

The bulb and leaves suggest a *Brunsvigia,* rather than a *Nerine,* while the flowers are not typical of either.

It is a plant which might well repay a careful cytological study. Its nomenclatural history goes to show how arbitrary our decisions are, and how careful we should be before insisting on changes to our presently

Plate 7

Nervilia marginata Herb. (= *Bonnevigia marginata* (Java) Alt.) Photocopy by H. King.

formidable synonymy.
accepted classifications. Each change means an increase in the already

NERINE MARGINATA Herb. Amaryllid. 283(1837); *Amaryllis marginata* Jacq. Hort. Schoenbr. 1:34, t.65(1797); *Brunsvigia marginata* Ait. Hort. Kew ed. 2,2:230(1811); *Imhofia marginata* Herb. App. Bot. Reg. 18(1821); *Elisena marginata* Roem. Amaryllid. 63.

Description:—[Plate 7] *Bulb* 4—5 cm. long, about 4 cm. in diameter with a dark brown tunic. *Leaves* 4, produced "after" the flowers, spreading on ground, obovate-oblong or long ligulate, obtuse, up to about 25 cm. long, 6—7 cm. broad, with a reddish crisped cartilaginous margin. *Peduncle* compressed, about 12—20 cm. tall and 1 cm. thick. *Spathe-valves* 2, deltoid, 2—3 cm. long. *Umbel* with 10—20 flowers. *Pedicels* somewhat spreading, 5—7 cm. long, 2—3 cm. thick, not much tapered. *Perianth* more or less regular, bright scarlet, 3—3.5 cm. long; tube 5—7 mm. long; lobes lanceolate, spreading recurved, slightly undulate. *Stamens* longer than the perianth, nearly straight, anthers oblong, 6—8 mm. long. *Style* straight, slightly longer than stamens. *Ovary* moderately 3-angled, turbinate, 1—1.5 cm. long, 5.8 mm. broad across the angles; capsule up to 2 cm. long, 1.5 cm. broad.

Distribution: — Cape Province: Tulbagh, Wellington, Ceres Paarl.

KEY TO THE SPECIES OF **BRUNSVIGIA**

The following key to the species of *Brunsvigia* is, like most of its kind, merely a guide to correct identification and must be used in this spirit. The distribution records and notes should be consulted also, before coming to final decisions in specific identifications.

1a. Leaves 2—6 (rarely up to 8), soon spreading prostrate on ground:
  2a. Perianth with a slight bend near the base and the upper 3 lobes more recurved than the 3 lower ones; leaves up to 45 cm. long and 12 cm. broad, velvety ..... 11. *orientalis*.
  2b. Perianth with the lobes spreading fairly regularly from the tube:
    3a. Leaves and inflorescence not present at the same time:
      4a. Peduncle up to about 6 cm. and rarely 10 cm. long, pedicels rarely up to 5 cm. long:
        5a. Leaves with papillae or long bristles on upper surface ..... 1. *radula*.
        5b. Leaves without papillae or bristles on upper surface ..... 2. *comptonii*.
      4b. Peduncles generally more than 10 cm. long and pedicels more than 5 cm. long:
        6a. Filaments and style becoming appreciably longer than the perianth, flowers sweetly scented ..... 3. *bosmaniae*.
        6b. Filaments sometimes equalling but rarely much longer than the perianth:
          7a. Filaments of at least 3 of the stamens with appendages near the base ..... 4. *appendiculata*.
          7b. Filaments without appendages:
            8a. Umbel up to about 20-flowered, peduncles rarely up to 20 cm. tall and 1 cm. diam.:
              9a. Leaves about 2.5 cm. broad ..... 5. *minor*.
              9b. Leaves 5—7 cm. broad ..... 6. *striata*.
            8b. Umbel 20—40 flowered, occasionally up to 80-flowered, peduncle up to 50 cm. when mature, only occasionally less than 15 cm. and 1.5 cm. in diam.:

10a. Leaves smooth on upper surface, up to 18 cm. long and 8 cm. broad ..... 7. *gregaria*.
10b. Leaves generally rough, at least on upper surface, and leaves 25—50 cm. long and 10—20 cm. broad ..... 10. *radulosa*
3b. Leaves and inflorescence developing at the same time:
11a. Leaves generally rough, at least on upper surface, tough:
12a. Peduncle 18—25 cm. tall, produced November or early December; pedicels 10—12 cm. long ..... 8. *natalensis*.
12b. Peduncle 30—50 cm. tall, produced February—March, rarely earlier, pedicels 20—30 cm. long ..... 10. *radulosa*.
11b. Leaves generally smooth on both surfaces, rather soft and soon becoming flabby on drying ..... 9. *sp.*
1b. Leaves 8—20, ascending when young and only spreading on ground with age, usually somewhat glaucous:
13a. Perianth pink to claret-coloured with all the lobes spreading fairly regularly, 4.5—7 cm. long:
14a. Perianth pink, 5—7 cm. long:
15a. Bulb below ground except perhaps for the neck, with membranous tunic ..... 12. *grandiflora*.
15b. Bulb mainly above ground, the tunic partly cartilaginous thickened ..... 13. *sp.*
14b. Perianth claret-coloured, 4.5—5.5 cm long, bulb below ground, with membranous tunic ..... 14. *undulata*.
13b. Perianth mainly red, 7—9 cm. long, with the upper lobes strongly recurving, the lower three spreading:
16a. Bulbs up to 20 cm. diam., mainly or entirely above ground, largest leaves up to 90 cm. long ..... 15. *josephinae*.
16b. Bulbs up to 10 cm. diam., below ground, largest leaves up to about 40 cm. long ..... 16. *litoralis*
1c. Leaves less than 8, ascending, bulb partly exposed above ground ..... 17. *sp.*

DESCRIPTION OF SPECIES

1. B. RADULA Ait. Hort. Kew, ed. 2,2:230(1811); Baker in Fl. Cap. 6:208 (1896); *Amaryllis radula* Jacq. Hort. Schoenbr. 1:35,t. 68 (1797).

Description: [Plate 8, left] *Bulb* globose with a short neck, 2—2.5 cm. diam. covered with a tunic of old leaf bases. *Leaves* 2—3, spreading on ground, developed "after" the inflorescence, oblong or lingulate up to about 8 cm. long and 3.5 cm. broad, obtuse, thick, covered on the upper surface and margin with rough papillae with enlarged bases, smooth and light green on under surface. *Peduncle* 1 or 2 produced at the same time, up to 10 cm. long and 5 cm. thick, compressed, with 2 ovate-oblong, reddish bracts, about 2 cm. long. *Umbel* 3—5-flowered, somewhat spreading. *Pedicels* up to 5 cm. long, 2—3 mm. thick, angled, not much tapered. *Perianth* often unsymmetrical, flesh-coloured-pink, 2.5—3 cm. long, with a very short tube; lobes linear-lanceolate, spreading, recurved, undulate, often the lowest subtending the stamens and style. *Stamens* declinate, about equalling the perianth. *Style* slightly longer than the stamens. *Ovary* roundish and obtusely angled; capsule 3-angled.

Distribution: There is no exact record for the type.

Notes: The type specimen figured by Jacquin was almost certainly collected by Boos and Scholl for the Royal Schoenbrunn gardens in Vienna. Specimens aligned with it by Baker were recorded from near the Olifants River and it would seem that its distribution is from about

(Left), *Brunsvigia radula* (Jacq.) Ait., Photo copy by H. King; (right), *Brunsvigia bosmaniae* Leighton (type), photo by Prof. R. H. Compton.

Plate 8

Calvinia and Clanwilliam into Little Namaqualand round Steinkopf, while a specimen in Bolus Herbarium from Swellendam division may be a form of it. The bristles or papillae on enlarged bases on the leaves are a most interesting feature of this small species, and distinguish it readily from all other species recognised in this review. Specimens without leaves, are very similar to the recently described *B. comptonii*.

2. B. COMPTONII Barker in Journ. S. Afr. Bot. 14:29 (1948).

Description: Bulb oblong-globose, 3—4 cm. long, 2.5—3 cm. in diam., covered with a chestnut-coloured cartilaginous tunic, produced into a neck 2—7 cm. long. *Leaves* 3—5, absent at time of flowering, adpressed to the ground, ovate, subacute or obtuse, closely veined, glabrous, 3—4 cm. long, 2—3 cm. broad. *Peduncle* purplish-brown, flattened, 3—6 cm. long, 5—8 mm. diam. *Umbel* small, 6—16 cm. diam. 6—13-flowered. *Pedicels* greenish, tinged purple-brown, 1.5—3.5 cm. long, lengthening slightly in the fruiting stage, 3-angled. *Spathe-valves* 2, papery, reddish or purplish, as long as or a little longer than the pedicels, rarely shorter. *Perianth* pale to dark pink, cut nearly to the base; segments 2—2.7 cm. long, 4—5 mm. broad, curved upwards or one remaining at the base subtending stamens and style, the margins sometimes distinctly undulate. *Stamens* declinate, biseriate; the 3 long ones equalling the perianth; the others slightly shorter; filaments pale to deep pink, sometimes with 2 minute appendages near base. *Style* pink, somewhat longer than filaments. *Ovary* green, tinged with purple-brown, 3-angled. *Capsule* up to 1.5 cm. long, 1 cm. diam. turbinate; seeds pinkish, up to 5 mm. long.

Distribution: Cape Province, Laingsburg district. It is sometimes locally common in this district. A collection by R. du Toit near Sutherland and another by Leipoldt near the Orange River in the Kenhart district may belong to this species.

Notes: The flowering of this small species is irregular in abundance, depending no doubt largely on seasonal conditions. In a good season plants may flower in profusion according to Professor R. H. Compton, after whom the species is named. It is found wedged in the crevices of hard Dwyka shale, sometimes on steep slopes, the bulbs in many cases being compressed due to rock pressure.

Miss Barker points out that the affinity of the plant is with *B. striata* Ait. and *B. radula* Ait. It differs from the former by being less robust with shorter pedicels and the leaves smaller, and from the latter by having leaves without raised papillae. A line drawing, accompanying the original description shows a complete plant and a series of flowers with the segments variously spreading. As the inflorescence and leaves appear at different times it will generally be necessary to have the complete life-story if one wishes to distinguish specimens from *B. radula*, where the leaf distinctions are more evident than floral ones.

3. B. BOSMANIAE Leighton in S. Afr. Gard. 22:137, 143 (1932).

Description: [Plate 8, right] *Leaves* 6, produced "after" the inflorescence, up to about 15—20 cm. long and 4—8 cm. broad. *Peduncle* 19

cm. long. *Pedicels* 4—4.5 cm. long, developing up to about 10 cm., comparatively stout. *Perianth* shell-pink with veining in a darker shade, sweetly scented; lobes about 4 cm. long, obtuse; the upper 3 somewhat recurved; the lower 3 spreading, leaving the intermediate space free for the declinate stamens. *Stamens* exserted from perianth; anthers 6 mm. long. *Style* up to 6 cm. long. *Ovary* ovate, acutely angled, 1.2 cm. long, 1 cm. in diameter.

Distribution: Cape Province; type said to be from Stellenbosch district, Kuils River. Similar specimens have been collected from Worcester, Laingsburg, Clanwilliam and van Rhynsdorp districts.

Notes: It is unfortunate that the leaves of this species are not recorded in detail. They were not fully developed when the original description was published and it has not been possible so far to obtain further material from the type locality, if in fact the wild habitat of the type is actually Kuils River. The author observed that the plants flowered in March, and that it was the first scented *Brunsvigia* which had come under her notice. She also pointed out that the rather densely-flowered umbel of about 20 flowers had about 15 open at one time. The perianth is recorded as shell pink, with veining in a darker shade and the lower lobes diverge leaving the intermediate space entirely free for the declinate stamens and style as often occurs in *Nerine*. The long filaments exserted from the perianth seem of diagnostic value.

The fact that the author drew special attention to the presence of a sweet scent points to the identity with it of a plant collected further inland near Touwsriver by van Breda, 1160. The flowers of this were recorded as strongly scented and the flowers were very pale pink to almost white. Other specimens which agree closely have been collected in the Laingsburg, Clanwilliam and Van Rhynsdorp districts by van Breda, Compton and Smith.

4. B. APPENDICULATA Leighton in S. Afr. Gard. 22: 137, 143 (1932).

Description: Bulb globose, up to 8 cm. in diameter. *Leaves* 6, produced "after" the flowers, procumbent, often up to 15 cm. long, and 4.5 cm. broad, with a crisped cartilaginous margin. *Peduncle* about 8—10 cm. long and 1 cm. diameter. *Spathe-valves* 5 cm. long and 1.8 cm. broad. *Umbel* 20—75-flowered, 20—30 cm. in diameter. *Pedicels* 7—10 cm. long. *Perianth* about 3.5—4 cm. long, with a short tube but the margins of the lobes free to the base in the typical form; tube occasionally 3—4 mm. long; lobes linear-lanceolate, 3.5—3.8 cm. long, somewhat recurved, 8—9 mm. broad; the outer generally broader. *Stamens* with filaments declinate incurved above; the outer 3.8 cm. long and the inner 2.8 cm. long; those opposite the outer perianth lobes conspicuously appendiculate with subereet side lobes; those opposite the inner perianth segments more shouldered than appendiculate. *Ovary* 1.7 cm. long, ovules few in each cell; capsule cuneate, 3-angled, up to 4 cm. long and 3 cm. broad across the apex.

Distribution: The type is recorded from Vredenberg in the Malmes-

bury distr. and other specimens agreeing with it have been collected in the districts of Belville, Ceres, Piquetberg and Clanwilliam.

Notes: The following observations were made by L. Bolus when the species was first described: "In general habit and size it would rank among the less conspicuous in the genus; but it is, nevertheless, very attractive with its reddish-green peduncle, purplish-grey spathe-leaves and deep pink perianth with darker veining. The flowers attain a length

Fig. 11. *Brunsvigia minor* Lindl., photo copy from Bot. Reg. pl. 954 (1826) by H. King.

of 3.8 cm. and the six leaves produced after the flowers, are 15 cm. long and up to 4.5 cm. broad, arranged in two ranks and lying flat on ground and, seen from above, are slightly falcate. Three characteristics are to be specially noticed—the absence of a perianth tube, the stamens not exserted beyond the perianth, and the presence of appendages at the base of the filaments—because in *B. striata* Ait., to which *B. appendiculata* is most nearly allied, there is a tube of about 6 mm., the stamens are described as being 'distinctly exserted,' and no mention is made

of any appendages on the filaments, a feature which has not hitherto been recorded in the genus.''

The statements about the length of the tube and the excerted stamens in *B. striata* were evidently taken from Baker's description of *B. striata* and not from Jacquin's original. The original refers to slightly connate perianth segments and stamens about equal to the perianth in length, which agrees with his figure.

The presence of appendages to the filaments of this species is certainly of particular interest and is a character repeated in some species of the allied genus *Nerine*. Although the typical form has practically no perianth tube, some specimens with appendiculate stamens have tubes and are classified together. Another feature of interest, judged from herbarium specimens, is the opening of a large number of flowers almost at the same time and the comparative density of the heads.

In my notes on *B. striata*, I have mentioned the possibility that appendiculate filaments may well have been overlooked, and that both *B. striata* and even *B. minor* might have been forms of what is now recorded as *B. appendiculata*. Unless the figured type specimens of the first two species are discovered, however, there will be no means of checking this suggestion.

5. B. MINOR Lindl. in Bot. Reg. 11 : t.954 (1826) ; Baker in Fl. Cap. 6 :206 (1996) in part, not as to the majority of citations.

Description: [Fig. 11] The following is a free translation of the original description: *Leaves* 3—4, oblong, spreading on the ground, shorter than the scape, with the scape longer than the peduncles of the umbel, spathe valves erect, fleshy, with the perianth 6-parted.

Distribution: There is no exact information about the type : Possibly from van Rhynsdorp district.

Notes: We read in the original account that the plant described was cultivated by James H. Slater of Newick Park ''a gentleman whose valuable communications have often been gratefully acknowledged in this publication.'' Slater noted that the leaves of his plant were rather broad for their length, *about 6 in. long and rather more than 1 in. broad.* Lindley follows this up by saying that the leaves in his figure were different from the description but that Slater's observations were made the year before the inflorescence appeared.

The original description and illustration of *B. minor* is inadequate for certain identification with material from the wild and it poses another difficult question for the reviewer. Baker has identified with it a well collected plant from the eastern Cape Province and also plants from the very different region of Namaqualand. The eastern Cape plants are generally more robust and have broader leaves than shown in the illustration of the type. They cannot therefore be regarded as typical, nor is it likely that they are specifically equal to the specimen from Namaqualand cited by Baker.

A specimen in the National Herbarium, Pretoria, Marloth 13339,

from van Rhynsdorp, and identified by Marloth as *B. minor* Lindl. could very well represent the typical form as also specimens collected in the same region by G. G. Smith 6421, 6423, in the National Botanical Gardens, Kirstenbosch herbarium. These specimens show no appendages on the filaments of the stamens.

The eastern Cape specimens, which are generally considerably more robust, have exhibited great variability in an abundance of fresh material received from several collectors. On the resulting herbarium specimens, without a knowledge of their history, one might well suspect the presence of several species. They are referred to under the new name *B. gregaria.*

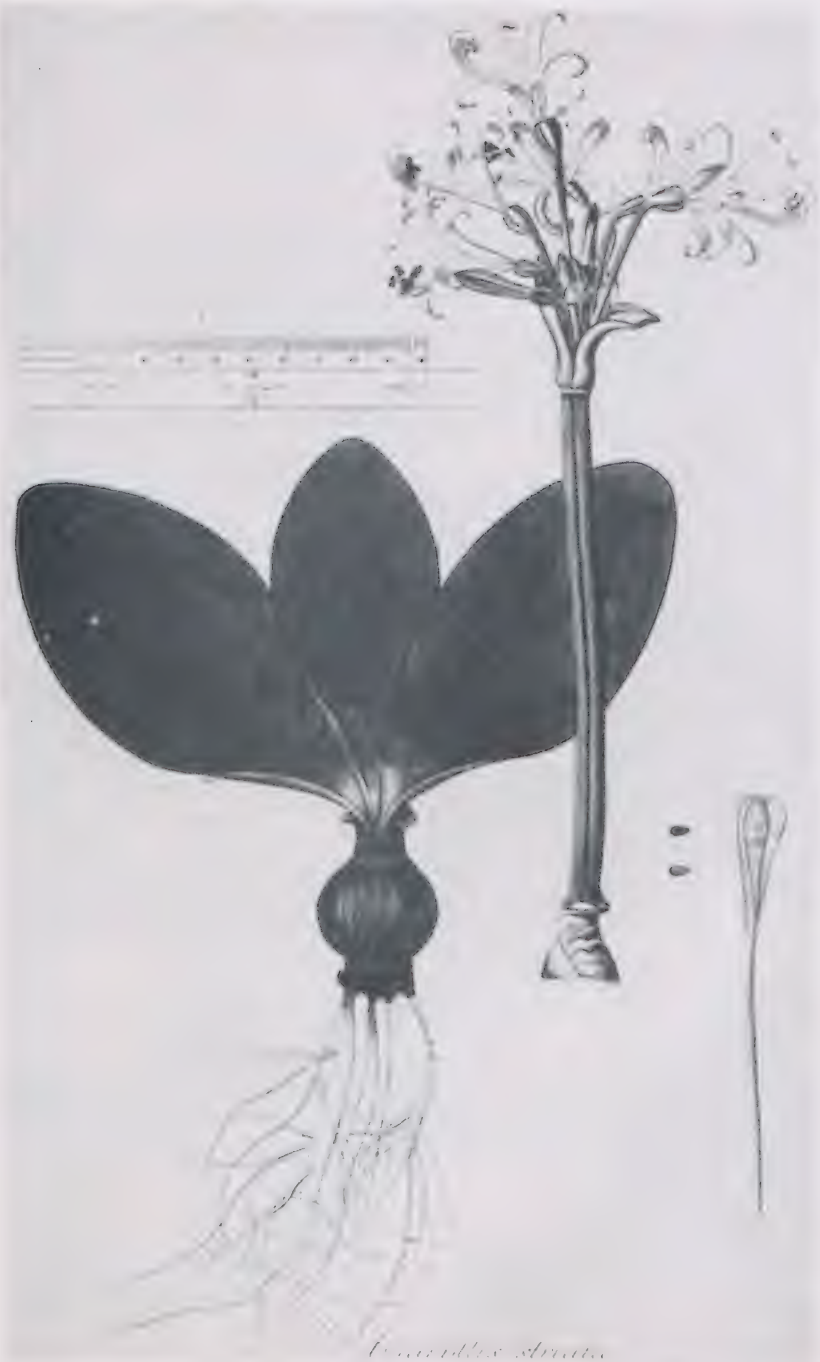
6. B. STRIATA Ait. Hort. Kew ed. 2, 2:231 (1811); Baker in F. Cap. 6:207 (1896); *Amaryllis striata* Jacq. Hort. Schoenbrunn 1:36, t. 70 (1797).

Description: [Plate 9] *Bulb* ovoid, about 3—4 cm. in diam., covered with a dark brown tunic. *Leaves* usually 3, produced "after" the flowers spreading horizontally on maturing, oblong, 10—15 cm. long, 5—7 cm. broad, smooth, with an entire thickened scabrous margin and closely ribbed on under surface. *Peduncle* 15—20 cm. long, 1 cm. broad, erect, compressed, green suffused with pink and with 2 oblong subacute bracts. *Umbel* with up to about 20 flowers. *Pedicels* up to about 7 cm. long, 3—4 mm. thick, slightly longer in fruit and fairly uniform throughout. *Perianth* red to rose, 3.5—4 cm. long, with a short tube about 3.5 mm. long; lobes about equal, linear-lanceolate, 3—3.5 cm. long, 5 mm. broad, slightly undulate, spreading recurved. *Stamens* with the filaments about equal in length to perianth, pink, anthers, oblong, dark red. *Style* elongated slightly more than stamens. *Ovary* moderately 3-angled, about 1 cm. long, and 6—8 mm. broad; capsule 3-angled, somewhat cuneate, obtuse, about 1.5 cm. across the angles near the top, with a few seeds.

Distribution: The type specimen was from the Cape of Good Hope without more precise locality.

Notes: The type was probably collected by Boos and Scholl and sent to Austria for the Royal Schoenbrunn gardens. It was there described and painted by Jacquin before 1797, after flowering in its European surroundings in September and fruiting in October. There is no character mentioned in the description which identifies this species with certainty. It seems a close relative of *B. minor* Lindl., the type of which is also vaguely localized as the Cape. A specimen collected by Marloth near Piquetberg and identified by him as *B. striata* may well be correctly named, although the inflorescence is rather dense. On the other hand alternate filaments have appendages on the filaments near the position of the insertion on the perianth as in the case of *B. appendiculata* and thus is classified under that species.

The possibility arises that *B. striata* and *B. minor* were based on specimens which would now be placed under *B. appendiculata.* The original descriptions of the two first mentioned species make no mention of



Brunsvigia striata (Jacq.) Ait., photo copy by H. King, from Jacquin.
Plate 9

Brunsvigia gregoria R. A. Dyer, *sp. nov.* (See opposite page for legend.)

Plate 10

appendages on the filaments but they may have been present. The degree of reliability of appendages on filaments as a basis of specific separation requires careful attention.

7. **B. gregaria** R. A. Dyer, **sp. nov.**, affinis *B. striatae* Ait. et *B. minori* Lindl. habitu robustiore umbella densiore differt.

Bulbus subglobosus, 4—6 cm. diam. *Folia* hysterantha, usque 18 cm. longa, 5—8 cm. lata, plana, margine scabrida. *Pedunculus* compressus 12—25 cm. longus, 1—2.5 cm. diam. *Umbella* 30—50-flora. *Pedicelli* 7—15 cm. longi. *Perianthium* roseum vel rubrum, 3—5 cm. longum tubo 4—5 mm. longo, lobis lineari-lanceolatis. *Ovarium* 3-angulatum. [Plate 10]

Cape Province: Uniondale Div.; Fourcade 2090. Port Elizabeth—Uitenhage Divs.; Holland, Cruden 406, Paterson 507, Long 558, Ecklon and Zeyher, Story 3355, 3356, 3361, 3357, 3358, 3359. Alexandria Div.; Story 3362, 3363, 3460, 3461, 3462, Galpin 10657. Bathurst Div.; Sidey, Davies, Story and Britten 3351. Albany Div.; outskirts northwest of Grahamstown, Britten in National Herbarium, Pretoria 28397 (flowers) and 28398 (leaves) types, Dyer 416, Story 3350, 3352, 3364, 3365, Erens 2194, MacOwan 507 (also Somerset East Div.). Kingwilliamstown Div.; Story 3453, Erens 2235. Ft. Beaufort Div.; Moore. Adelaide Div.; Story 3368. Bedford Div.; Stent, Erens 2212.

Description: [Plate 10] *Bulb* subglobose, 3—6 cm. diam. with short neck and cartilaginous tunic and sometimes with bristles; the young scales with a band of cartilaginous thickening below the neck of the bulb. *Leaves* 4—6, rarely 8, appearing soon "after" the inflorescence, spreading on ground, up to 18 cm. long and 8 cm. broad, smooth on both surfaces but sometimes puberulous on the upper surface when young, with scabrous and slightly viscid margin. *Peduncle* compressed, 12—25 cm. tall, rarely less, 1—2.5 cm. diam. *Spathe-valves* deltoid, 4—5 cm. long, 3—3.5 cm. broad. *Umbel* 30—50-flowered, occasionally more. *Pedicels* reddish-brown, 7—15 cm. long, very rarely less than 7 cm., 6-ribbed. *Perianth* pink to crimson, 3—5 cm. long, with tube about 4—5 mm. long; lobes linear-lanceolate, undulate or nearly flat. *Stamens* more or less biseriate, about equal or shorter than the perianth. *Ovary* 3-angled; capsules in robust specimens up to 3 cm. long and 2.2 cm. broad, but generally less.

Plate 10. *Brunsvigia gregaria* R. A. Dyer, *sp. nov.* [See opposite page for illustrations]. (Left), exceptional example with inflorescence from axil of current season's leaf; collected near Alexandria in Eastern Cape Province by H. King, after all normal flowering had ceased; photo by J. Reyburn. (Right), normal examples showing large difference in size of plants growing together in Eastern Cape Province; collected by R. Story; photo by H. King. (Center inset), an example (Story #3366) growing in its native habitat, Eastern Cape Province; photo by R. Story.

Dioscorea velutina Baker (left), with young inflorescence; collected near type locality, Ind., Pakenat, by Acocks; leaves flat on ground in nature; (right), type number; photos by H. King.
[Plate 11

Notes: The variations in nearly all characters of this group of plants, particularly floral and capsule size, is so wide that the group has defied clear classification. A general tendency is for the western plants from Port Elizabeth and Uitenhage divisions, possibly Humansdorp too, to be smaller than those from further west and inland. Examples collected in Uitenhage Divisions by *Ecklon* and *Zeyher* were given the manuscript name "*humulis*" and, except for the considerably denser umbel, could have been identified with *B. striata,* and in other cases where the *very young* leaves are narrow, there is some cause to think that *B. minor* could be nearly matched among them, as Baker did, but the leaves broaden appreciably as they mature. Story collected abundant fresh material in 1948 in the eastern Cape, but instead of clarifying the position, it only confirmed the complexity of the problem of correct classification. The following notes from R. Story are valuable in this connection:

Story 3364. "Larger flowers than usual, otherwise similar to 3350. Perianth lobes vary from linear to almost obovate, some with slightly undulate margins, others without. With reference to your query about differences noted in the field between the coastal and inland (Grahamstown) forms, I have found the differences in size and colour to be so numerous that I fail to draw a hard and fast line between them. If most of the head is eaten off (by stock) (I noted several such plants) the remaining flowers grow much bigger. If I note any so to speak tangible differences I shall let you know, but so far they seem to be all one species to me."

The selection of the Britten specimens as the types was due to the fact that together they give, as near as possible in herbarium material, a complete picture and they come from an area where the plants are possibly more uniform than elsewhere. The Ecklon and Zyher specimens mentioned above are immature and incomplete and there seems to be the greatest variation in characters in plants from the Uitenhage—Alexandria area. In identifying plants from that area one will be obliged to use the qualifying term "form" rather freely until a more exact understanding is reached.

8. B. NATALENSIS Baker in This.-Dyer Fl. Cap. 6:208 (1896).

Description: [Plate 11] *Bulb* subglobose, about 5 cm. in diameter with a short neck and covered by a cartilaginous tunic. *Leaves* appearing with the inflorescence, oblong, obtuse, 15—25 cm. long, 10—12 cm. broad, more or less scabrous on upper surface, occasionally smooth on margin and mainly smooth on lower surface, fairly tough. *Peduncle* 18—25 cm. tall, 1.5—2 cm. broad, compressed. *Umbel* densely 30-60-flowered. *Spathevalves* ovate, 3—6 cm. long. *Pedicels* 10—12 cm. long in flower and sometimes developing longer in fruit. *Perianth* about 4 cm. long with the tube about 5 mm. long; lobes deep pink, narrowly oblong-lanceolate. *Stamens* about as long as the perianth. *Ovary* turbinate; *capsule* 2.5—3 cm. long and 2—5 cm. broad.

Distribution: Type from Weenen country in the mountainous midlands of Natal. Further research is required to establish the limits of

Brunsvigia sp. ?, referred to under No. 9 in text; (inset at lower left), plant in native habitat (rock crevice—note J. Erens' hand to indicate relative size); (main subjects), plants, collected by L. E. Codd & J. Erens, showing leaf and bulb characters for comparison with *B. natalensis* Baker. Photos by L. E. Codd.
Plate 12

distribution as is mentioned in the following notes.

Notes: The statement in the description of the type that the leaves are glaucous on both surfaces cannot be verified, as there is no such statement on the label. It seems unlikely to be true.

B. natalensis is very closely related to the plants classified as *B. radulosa* and there will be times when there may be no clear distinction. The time of flowering is generally different, *B. natalensis* appearing in November or early December whereas *B. radulosa* is rarely earlier than February and often only comes into flower in March or even as late as April. *B. natalensis* is normally smaller in all respects, but size alone is not an infallible distinction.

At one time similar plants from the Waterberg and other parts of the Transvaal were considered conspecific with *B. natalensis* because of a general similarity and a similar early flowering period. The leaves, however, are less advanced at flowering, are longer, narrower and less rigid than in *B. natalensis*, and until it can be shown that the differences in these characters are due entirely to some reaction to the environment, it is thought better to exclude the plants from *B. natalensis* and attention is further drawn to the problem of the specific limits between them under no. 9 which follows.

9. B. sp. [Plate 12]

Description: Bulb more or less globose, up to 9 cm. diam., but usually less; neck short or up to 3.5 cm. long, covered by a cartilaginous tunic. *Leaves* 4—6, prostrate, young at time of flowering (December) elongating to about 30 cm. and 10 cm. broad, but in sheltered places may be up to 35 cm. long and only 6 cm. broad, more or less flaccid, moderately covered on the upper surface with minute asperities but not rough to the touch, glabrous below. *Peduncle* 20—30 cm. long, compressed, 2—3 cm. broad, glabrous. *Spathe-valves* 2, tinged with red, membranous, about 4 cm. long and about the same in width across the base. *Umbel* 30—50-flowered. *Pedicels* 10—20 cm. long, slightly 3-angled. *Perianth* pale to deep pink; tube about 4 mm. long; lobes linear-lanceolate, 3—4.5 cm. long, 5—7 mm. broad. *Stamens* about equalling the perianth in length. *Ovary* 3-angled, about 1 cm. long; capsule 3-angled, inflated, about 2.5 cm. long and 2 cm. broad.

Distribution: Transvaal; Waterberg mountains.

Notes: The specimens collected in the above locality look very distinct in leaf from typical *B. natalensis* but at various places in the Transvaal nearer Natal there are recorded plants which indicate that they bridge the gap between the two main groups. Specimens from the Drakensberg, Natal, have the narrow leaf of the Waterberg plants, but they are tougher, and rougher on the upper surface. By including all the forms under one species one would have another rather heterogeneous collection. The position is left open pending further observations.

[To be continued in Plant Life, vol. 7, Herbertia Edition 1951.]

Plate 13 Foster's fragrant *Alstroemeria caryophyllaea* Hybrids

BOMAREAS AND ALSTROEMERIAS

Mulford B. Foster, *Florida*

Almost anywhere in the Andes of Colombia, Ecuador or Bolivia, after you have reached an altitude of 10,000 feet, you may expect to see Bomareas. They grow profusely just above Bogotá, Colombia, vining their way through great masses of undergrowth with their lovely cylindrical heads of flowers pushing up to great heavily laden clouds. They present a beautiful picture but they were certainly not destined for Florida gardens because they cannot tolerate the low altitudes as a habitat. Occasionally we find plants that are indigenous to the higher altitudes and yet have the ability to adapt themselves to great changes in altitudes but not these Bomareas.

In Bolivia, 2,500 feet above La Paz, and La Paz is 12,000 feet above sea level, quite a different type of *Bomarea* may be found, one whose stiff upright stems support leaves which point towards the sky hoping for a bit of sunlight in those high cloud forests. The nodding heads of bell-shaped flowers, light green and pink were indeed retiring in their simple, quiet beauty. They had tubers three quarters of an inch in diameter and an inch and a half long that looked good enough to eat. These tubers were securely fastened between the rocks embedded in a bit of pure peat. They were strange amaryllids, but then, every plant in that queer clammy, cloudy, raw, cool climate was strange.

Growing with that *Bomarea* (not yet identified) were great mounds of cacti completely embedded in this same wet moss. Just about as "impossible" a condition as I've ever seen cacti growing in.

In Santa Catarina, southern part of Brazil, I found vining *Bomareas* at low altitudes not far from the sea and while they are not as colorful as the high altitude ones in Colombia and Ecuador, I do believe that they will succeed in Florida.

The first Bomareas I ever found growing natively, were in Colombia on South America's oldest mountain Sierra Nevada de Santa Marta. That was in 1946 when I found *B. gloriosa* and *B. moritziana*. They were vining types at fairly low altitudes, 3,500 to 4,000 feet. Interesting but not especially beautiful as their flowers are rather sparse and in loose open clusters. Pink sepals almost hiding the green petals would hardly have suggested the name "gloriosa" to me, at least not after having seen the glorious flower heads on the high altitude species, in the rain forests.

In Bahia, October, 1948, I found an *Alstroemeria* which reminded me so much of the low altitude bomareas that at first look I was confused. It nodding flowers of delicate pink and apple green were quite different from the alstroemerias with which I am familiar. It did not vine and the fruit was definitely that of an *Alstroemeria*.

As yet I have not been able to get a determination of this species although I have already crossed it with my other Brazilian alstroemerias

and have hybrid seedlings as a result. This species has bloomed for four months and shows no sign of letting up even at this late date, August 1, 1949.

Fig. 12. Corsage made from Foster's fragrant *Alstroemeria caryophyllaea* hybrids. Photo by B. M. Foster.

My *Alstroemeria* hybrids which have carried the perfume and shape of *A. caryophyllaea* are proving to be more and more interesting [Plate 13]. The range of colors and variations seem to be endless for they

range from almost pure white to deep crimson. Tints of yellow and a rich salmon, pink and even chartreuse are in the color spectrum of these lovely flowers; they bloom from May through July.

Following the suggestion of Mr. Stinson in 1942 Herbertia, the flowers of the new *Caryophyllaea* hybrids have been utilized in an unique corsage arrangement as shown in Figure 12.

Continued selection and careful breeding for the next few years will result, I am sure, in colorful alstroemerias that will take their place with the finest of the Pacific Coast hybrids and yet be different enough to have their own distinctive characters and colors.

AMARYLLID GENERA AND SPECIES

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to American and British readers.—*Harold N. Moldenke.*]

Amaryllis biflora Sesse & Moncino, Fl. Mex. ed. 2. p. 87. 1894; Traub & Moldenke, Tribe Amaryll. 137. 1949.

"*Amaryllis* with a 2-flowered umbel, tepalsegs equal, perigone campanulate, stamens and pistil declined (Illustrated in Nov. Hisp.). Rootstock a tunicated bulb, root-fibers below; peduncle terete, hollow, glabrous, 1½ times as long as the leaves; leaves oblong, canaliculate; spathe 2-valved, oblong, membranous, compressed, pale-reddish; umbel 2-flowered, rarely 3-flowered; pedicels terete, slightly shorter than the spathe, divergent, bent at the apex; perigone campanulate, the three setepalsegs broader, mucronate at the apex, the mucro inflexed.

"Growing near the town of Toa Alta, where it is commonly called 'Amapola.' It flowers in April. The tepals are coalesced at their base into an obtusely trigonous tepaltube, as is well shown in a funnel-form gamopetalous corolla."

Amaryllis cernua Sesse & Moncino, Fl. Mex. ed. 2. p. 85. 1894; Traub & Moldenke, Tribe Amaryll. 137. 1949.

"*Amaryllis* with the common spathe [umbel] many-flowered, the individual ones [pedicels] 1-flowered, alternate; perigones nodding; leaves ensiform. Flor. Mex. Rootstock a tunicated bulb; scape foliose [at base?], terete, glabrous, 6.1 dm. tall; leaves ensiform, sheathed, subequaling the scape; spathe-valves concave, keeled, very long, acuminate, entire, membranous, becoming purplish, subtending the pedicellate, drooping flowers, the three setepalsegs keeled, the three petepalsegs plane, slightly shorter and narrower; nectariferous scales none; stamens half as long as the perigone; anthers ovate, erect, drooping due to the inverse position of the flower; ovary inferior, triangular; style very short, stigma trifid, the lobes acute, spreading-reflexed.

"It grows at the very apex of the summit of the mountain Santo Heremo. It is a perennial and blooms in July."

Sprekelia ringens Morren, in Ann. Soc. D'Agr. et Bot., Gand, Jour. D'Hort. 2:133—138, pl. 60. 1846.

"Leaves radical, broadly lanceolate, glaucescent; flowers solitary, tepalsegs subequal, uniformly colored, the upper ones yellow-striped at the base and middle, and spreading, the three lower ones replicate-conjugate."

Crinum inodorum Tausch in Flora *19:* 422. 1836. Bulb pyramidal, leaves loriform, broadly lanceolate, denticulate along the margin; umbel many-flowered, sessile; the segments of the limb erect, linear, shorter than the tube; stamens erect, longer than the style. Cultivated in gardens at Prague under the name *C. americanum*. Scape compressed, with a single, 2-leaved, subequal, membranous, purplish spathe; umbel 9- or 10-flowered; corolla white, inodorous, the divisions of the limb erect, linear, channeled, surpassing the stamens, the base and fructification remaining completely erect; tube of the corolla obtusely 3-sided, slightly purplish at the base, one and a half times as long as the divisions of the limb; stamens erect, longer than the style.

Crinum odoratissimum Tausch in Flora *19:* 422. 1836. Bulb cylindric; leaves loriform, broadly lanceolate, denticulate along the margin; umbel sessile, many-flowered; the divisions of the limb broadly lanceolate, shorter than the tube; style shorter than the declinate stamens. Cultivated in gardens at Prague under the name *C. erubescens*, from which it differs in its greater size, the broadly lanceolate instead of linear-lanceolate divisions of the limb, and the style being shorter than the stamens.

Zephyranthes Briquetii Macbride, in Field Mus. Nat. Hist. Publ. 288, Bot. Ser. *11:* 9. 1931. Plant dwarf, prostrate, 5—8 cm. long in all; bulb narrowly ovate-oblong, 8 mm. in diameter, attenuated into a neck about 1—2 cm. long; leaves 2 or 3, linear, 3—6 cm. long, about 1 mm. wide, subulate-acuminate at the apex; scape 1—3 cm. long, 1-flowered; spathe membranous, bifid almost to the base, about 1.5 cm. long; pedicel 3—4 mm. long; ovary 6 mm. long; perigone white (sometimes violet-spotted), about 2 cm. long, the tube slender, about 5 mm. long, rather abruptly widened at the throat, the divisions subequal, apparently rather rounded and connate to each other; filaments free, dilated toward the base, about 3 mm. long; inserted at the apex of the tube; style equaling or surpassing the stamens; stigma 3-foliose-lobed. Peru: with cushion and rosette plants, Carumas, Prov. Moquequa, Feb. 27, 1925, Weberbauer 7322 (type, Field Museum.)

Crinum darienense Woodson in Ann. Missouri Bot. Gard. *25:* 824. 1938. Bulb not well developed, ovate-oblongoid, 1.2—1.7 cm. in diameter, stoloniferous; leaves clasping at the base, produced into a sheath, 20—32 cm. long, the blade oblong-elliptic, abruptly subcaudate-acuminate at the

apex, flat, delicately subsucculent-membranaceous, 3.5—5.5 cm. broad, obtuse at the base, produced into a petiole 0.6—1 cm. long, erose-denticulate along the subcartilaginous margin, the sheath 3—5 cm. long, 0.8—1.5 cm. wide; peduncles 9—14 cm. long, 2—4-flowered; spathe at anthesis 2-parted to the base, each part ensiform, to 7 cm. long; flowers sessile; tube of the perianth very slender, 21—25 cm. long, about 0.15 cm. in diameter at the base, slightly widened near the throat, apparently whitish, the lobes oblong-elliptic, ecuminate at the apex, white, 7.5—8 cm. long, 1.2—1.5 cm. wide; filaments of the stamens subulate, red, about 4 cm. long, anthers oblong, arcuate, 1.2 cm. long; ovary ellipsoid, 1.2—1.5 cm. long, about 0.4 cm. in diameter; style red, 4.5 cm. long; stigma punctiform.—DARIEN: trail between Pinogana and Yavisa, alt. ca. 15 m., March 17, 1937, P. H. Allen 264 (Herb. Missouri Bot. Garden, Type).

Crinum filifolium Perrier, in Bull. Soc. Bot. France, *86:* 90—91. 1939. Glabrous, 25—35 cm. tall; bulb 1—2 cm. wide; leaves 5—7, grass-like, linear-setiform, 15—20 cm. long, 1.5—2 mm. wide; scape equalling the leaves; peduncle short, 5—7 cm. long slender, 1.5—2 mm. in diameter, finely striate; bracts filiform, 2—4 cm. long; flower solitary, sessile; perigone white, the tube elongate, 14—16 cm. long, slender, 1.5—2 mm. in diameter; segments lanceolate, 5—5.5 cm. long, 8—10 mm. wide, subacute, lightly 7-nerved, at anthesis erect-connivent; stamens inserted at the mouth of the tube, subequal, slightly shorter than the segments; filaments slender, recurved toward the apex; anthers linear, 14—15 mm. long, medifixed; ovary sessile, 5 mm. tall; style very slender, 18—20 cm. long, 4.5—5 cm. longer than the perigone tube; stigma capitate. West [Madagascar]: sunny limestone rocks, Tsingy de Namoroka, near Andranomavo (Ambongo), Perrier 1646, November 1903.

Crinum (Stenaster) biflorum Baker, in Warb. Kunene-Sambesi Exped. 565. 1903. Bulb unknown; leaves linear, 61 cm. long, 1.6—1.9 cm. wide toward the base, at the apex noticeably attenuated, smooth along the margin; peduncle 61—91 cm. long, 1.2 cm. in diameter toward the base; umbel 2-flowered; pedicels very short; valves of the spathe lanceolate; ovary cylindric; perianth-tube straight, 12.7 cm. long, the segments lanceolate, 6 mm. wide, half as long as the tube; stamens distinctly shorter than the segments; anthers linear, 10—12 mm. long. Kuito; Longa, 1150 meters altitude (no. 543, 1899). Approaching *C. americanum* L.

Crinum (Platyaster) Harmsii Baker, in Warb. Kunene-Sambesi Exped. 565. 1903. Bulb unknown; leaves 5.1 cm. wide, distinctly denticulate and ciliate along the margin; peduncle 1.2—1.4 cm. in diameter; umbel 3-flowered; pedicels short; spathe valves lanceolate, ascending, 10—12.7 cm. long; ovary cylindric; perianth-tube straight, 10 cm. long, the segments of the limb oblong-lanceolate, equaling the tube, 1.2—1.4 cm. wide at the mid-point, attenuate at the apex and base, red-tinted on the back; stamens much shorter than the segments; anothers yellow, 8 mm. long. Kuebe, Malanque, 1250 meters altitude (no. 406, 1899). Closely approaching *C. americanum* L. and *C. erubescens* Ait.

CRINUM (CODONOCRINUM) STENOPHYLLUM Baker, in Warb. Kunene-Sambesi Exped. 566. 1903. Bulb ovoid, 2.5 cm. in diameter, the neck elongated; leaves 4 or 5, erect, 30 cm. long, linear, flaccid, 2—4 mm. wide, smooth at the margin; peduncle 30 cm. or more long, 4 mm. in diameter; umbel sessile, 2-flowered, spathe-valves lanceolate, 5.1 cm. long; perigone white, the tube curved, 10 cm. long, the segments of the limb oblong, 1.8—2 cm. wide, attentuate at the base, concolorous on the back; stamens declined, much shorter than the limb; anthers linear, 8 mm. long. Kulango, near Karonga, 1100 meters altitude (no. 406, 1899). Approaching *C. pauciflorum* Baker.

CRINUM ALGOENSE [Herb. Amaryll. 272 1837].—of my Appendix. Sweet Hort. Brit. Not yet flowering, from southern Africa near Algoa Bay, with leaves similar to those of *C. revolutum*, but narrower and very much chanelled. Perhaps a variety of *C. revolutum*.

CRINUM ALBUM [Herb. Amaryll. 272. 1837].—*Amaryllis alba* Forsk., Fl. Aegypt-Arab. 209.—with linear-lanceolate leaves, white flower, spathe 10-flowered, the flowers declinate. Kurma, Arabia.

CRINUM CAFFRUM [Herb. Amaryll. 272 1837].—of my Appendix, Sweet, Hort. Brit. Not yet flowering, similar to *C. campanulatum* and is hardly distinct.—*Caffrum* and *Formosum* Herb. App. are to be deleted. *Formosum* is *C. arenarium* var. *blandum*.

(Doubtful species. *Lanceanum* of myself in Sweet, Hort. Brit., from Surinam. Not yet flowering and perhaps to be reduced to a variety of *C. Broussonetianum* from Africa. *Formosum* Herb. Append., is the same as *Arenarium blandum* var. *falsum* said to have been brought from Brazil.) *C. Osbeckii* Desf. Cat. Hort. Paris, whose native habitat is unknown, is not among those received; a hybrid similar to my *hortense*, perhaps scabrum × capense? To be rejected for the same reason is *multiflorum* Desf.

CRINUM ESQUIROLII Lévl., Mem. Pont. Accad. Romana, 1906, p. 343. Bulbous, stem 5—8 dm. tall; leaves few, very thin (with the cells conspicuous), about 12 mm. wide; flowers 7-12, very large; ovaries sessile, the tube 10 cm. long, the limb 8 cm. long, the segments narrow (1 cm.), narrowly lanceolate, nerved, acuminate; stamens included; style very slender, 10—12 cm. long; stigma very small.

This plant, says the collector, is used by the natives for sprains and bruises; they soften the leaves over fire and apply them to the painful spot; because of this it is called "beau Roun." Kouy-Tocheou, June 18, 1904, Jos. Esquirol 134.

USDA DAYLILIES

[CONTINUED FROM PAGE 66, PLANT LIFE, VOL. 5, HERBERTIA EDITION, 1949]

Editorial Note.—As indicated in 1949 HERBERTIA, these have recently been distributed to nurserymen for propagation, and the U. S. Department of Agriculture does not have any stock on hand for further dissemination. Those interested may obtain them a little later

Fig. 13. *xHemerocallis* clone GOLDEN TRIANGLE
USDA Photo

when the nurserymen have had time to increase their stock sufficiently to offer these clones to the public.

GOLDEN TRIANGLE. [Clone #69; see Fig. 13.] Plant vigorous, 3⅔ inches tall; notable for the large, flat, triangular-shaped flowers of heavy substance, 6 inches or more across, and for full sun-resistance; sepsegs 1¼ inches broad, reflexed, Buttercup Yellow (RHS 5), lighter on edges;

petsegs 1¾ inches broad, not reflexed but pinched, main body of petseg Lemon Yellow (RHS 4), tip Buttercup Yellow (RHS 5); delightfully fragrant; midseason.

PURITY. [Clone #245; see Fig. 14.] Plant 3¾ feet tall; notable for fragrant, clearest Lemon Yellow self (RHS 4) flowers, 5¼ inches across; petsegs 1¼ inches, sepsegs ⅝ inch broad; late midseason; excellent for cut flowers.

Fig. 14. *xHemerocallis* clone PURITY
USDA Photo

SUSANNA. [Clone #210.] Plant 3⅓ feet tall; notable for clear Cadmium Orange self (RHS 8) flowers, 5 inches across; petsegs 1¼ inches and sepsegs ¾ inch broad; slightly fragrant; late midseason.

LEMON TULIP. [Clone #84] Plant vigorous and floriferous, 3⅔ feet tall; notable for the very long clear Lemon Yellow self (RHS 4) flowers; petsegs 1½ inches and sepsegs ¾ inch broad; late midseason; excellent for forcing.

GITA. [Clone #952] Plant 3 feet tall; notable for long Aureolin self (RHS 3/1) flowers, 4 inches across; petseg 1½ inches and sepseg ½ inch broad; late midseason.

[To be continued in 1951 HERBERTIA]

REGISTRATION OF NEW AMARYLLID CLONES

Registrars: Dr. J. B. S. Norton and Prof. W. R. Ballard

This information is published to avoid duplication of names, and to provide a space for recording brief descriptions of new Amaryllid clones. Names should be as short as possible—one word is sufficient. It is suggested that in no case should more than two words be used. *The descriptions must be prepared in the form as shown in the entries below, and must be typewritten and double-spaced.* The descriptive terms used should be in harmony with those given in the "Descriptive Catalog of Hemerocallis Clones, 1893-1948" by Norton, Stuntz and Ballard.

There is close liaison between the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY regarding the registration of new *xHemerocallis* clones. By cooperative arrangement with the HEMEROCALLIS SOCIETY, beginning with the 1951 HERBERTIA edition, descriptions of only such *xHemerocallis* clones for which the 50c registration fee has been paid to Registrar, Mr. Earl A. Holl, 3520 North Grant Ave., Indianapolis 18, Ind., will be registered, and numbered (example: 3322-R). The number "3322" indicating the number of the clone and the "R," the information that it is registered. The registration fee is required *only* in the case of *xHemerocallis* clones, and *not* for other amaryllids which are registered free of charge by the AMERICAN PLANT LIFE SOCIETY.

Correspondence regarding new amaryllid clones, including *Hemerocallis*, to appear in HERBERTIA should be addressed to Prof. J. B. S. Norton, 4922 40th Place, Hyattsville, Maryland, *enclosing self-addressed, stamped envelope, if reply is expected.*

For obvious reasons, there is a limit to the number of descriptions included from any one member in any one issue. Not more than six brief descriptions of clones under each generic heading will be published from any one member in any one issue of HERBERTIA. Descriptions of clones in excess of five brief descriptions, up to a total of 25, will be entered if the space required for each is limited to one line. In this case use should be made of the standard abbreviations already mentioned.

HYBRID CYRTANTHUS CLONES

Introduced by Mrs. Mary G. Henry, Gladwyne, Penna.

WILLIAM PENN. A 6—10-flowered clone of *xCyrtanthus Henryae* with shrimp red (RHS-616) flowers on opening, changing to a clear

coral pink (RHS-0619/1) after a few days. There may be flowers of at least three distinct color shades on the plant at the same time. For full description the reader is referred to the description of *xCyrtanthus Henryae* elsewhere in this issue. This clone is represented by specimen no. 83, in the Traub Herbarium. This clone is the type of *xCyrtanthus Henryae.*

In connection with the naming of the following *Cyrtanthus* hybrids, Mrs. Henry writes as follows: "During the war I was a four-star mother and Josephine was stationed in PEKING about a year and so that flower is named for her. She was also a year in DINJAN near the Burma Road in India. One of my sons, Norman, Jr., was on the Carrier NEHENTA BAY in the Pacific. My daughter Mary's husband, Edward Davis, was on the Landing Ship METIVIER. My other son, Howard, already has one named for his Carrier the BUNKER HILL, which was introduced a few years ago."

PEKING. Light jasper red (Ridgeway); center of each tepalseg has a comparatively wide cream stripe; tepalsegs are broad and well recurved. Very handsome flower.

DINJAN. This is nearest to "Rose Dore" color in Ridgway, but it has a hint of carmine which gives the flower a sort of luminous glow that is very attractive. Unusual and striking color, near crushed raspberry.

NEHENTA BAY. Delightful shade of coral pink (Ridgway). The edges of the perigone are deeper in color; the pedicels too are pink, giving a very pleasing effect. Fine, large, well shaped flower.

METIVIER. The color of the perigone is "Pinard yellow" (Ridgway); the flowers are the largest so far in these Cyrtanthus hybrids, the diameter of the perigone measuring 2.8 cm. Exceptionally vigorous, fast growing plant.

GLADWYNE. A self of an exquisite shade of true pale pink (Jasper pink, Ridgway). Fair sized flowers of perfect form. A very lovely flower.

HYBRID xHEMEROCALLIS CLONES

TRIAL GARDENS. Cooperative daylily trial gardens have been established at (1) *Cornell University, Dept. of Floriculture, Ithaca, N. Y.;* (2) *University of Florida, Dept. of Horticulture, Gainesville, Fla.* (3) *Southwestern Louisiana Institute, Dept. of Horticulture, Lafayette, La.;* (4) *Whitnall Park Arboretum, Milwaukee City and County Park Board, Milwaukee, Wisc.;* (5) *Texas A. & M. College, Dept. of Horticulture, College Station, Texas;* (6) *Des Moines Park Board, Des Moines, Iowa;* (7) *Dir. Ornamental Hort., Univ. of Calif., at Los Angeles.* [Complete addresses are given under *Officers and Committees, below.*]

Introducers should send complete collection of hybrids to these cooperating agencies in order that the new daylily clones may be impartially evaluated.

The following information was sent in during 1949:

Introduced by Hubert A. Fischer, Hinsdale, Ill.
CARILLON. 40"; M; OM1; de; fr. (2749)
ESCAMILLO. 30"; MLa; OMYL3; de. (2750)
SCARF DANCE. 40"; M; YOD2-P; de. (2751)
SMILING THRU. 30"; MLa; OM1; de. (2752)
TINY TOT. 36"; MLa; ROM YL3; de. (2753
TWILIGHT GLOW. 40"; MLa; RL2; de. (2754)
WHITE SHADOWS. 30"; MLa; RL2; de. (2755)

Introduced by Mrs. H. W. Lester, Brookhaven, Ga.
DRAGONETTE. 36"; M-La; ORM1. (2756)
LEMON LUSTRE. 40"; La; YM1; de; fr.; ext. (2757)
MARIONETTE. 36"; M-La; YD2-S; de. (2758)
SPRING FANTASY. 30"; EE; RLYL3; de. (2759)

Introduced by W. T. Wood, Macon, Ga.
BILL WOOD. 44"; MRe; RM1; de. (2760)
MARIE WOOD. 36"; M; RL1; de. (2761)
ORANGE ICE. 36"; M; OM1; de. (2762)

Introduced by Stanley E. Saxton, Saratoga Springs, N. Y.
UNCLE JOE. 36"; MLa; RO1. (2763)

[TRAUB— AMARYALLID NOTES, CONTINUED FROM PAGE 62.]

Stenomesson Ferreyrae Traub **sp. nov.** Planta bulbosa, collo longissimo; foliis linearibus acutis 8—17 cm. longis coetaneis; pedunculo sub anthesi 6—14.5 cm. alto; umbella uniflora; spatha infra connota, deinde ad partem unicum fissa, supra denuo connata, cacumine ipso acuta; flore 7 cm. longo; tubo tepalorum gracili, parte tertia superiora dilatata; segmentis tepalorum 18 mm. longis, 6 mm. latis, acutis; poculo staminorum 2 mm. longo, aliquando inter filamento obscure dentato; filamentis 6 mm. longis. Exemplar typicum: Ferreyra 5296, Herb. Traubi access. 106.

TYPE DESCRIPTION.—Rootstock a tunicated bulb, to 3 cm. in diam. to 4.5 cm. long, with very long neck, 8—17 cm. long; 3—4, linear, acute, 4.5 mm. wide, contemporary with the flowers January (Peru); peduncle 6—14.5 cm. tall at anthesis; umbel 1-flowered; flower red suberect or pendulous above ovary; spathe to 6.5 cm. long, united below to 3.6 cm., then slit open on one side for 1.7 cm., and again united for 1.2 cm. to the pointed apex; pedicel to 3.6 cm. long; perigone to 7 cm. long; ovary 1.2 cm. long; tepaltube to 4 cm. long; tepalsegs to 1.8 cm. long, to 6 mm. wide, apex acute; parandroecium (staminal cup) 2 mm. long, sometimes obscurely toothed between the filaments; stamens slightly shorter than the tepalsegs, filaments attached at the edge of the staminal cup 6 mm. long, anthers 9 mm. long, with median attachment, versatile; style filiform, exserted 3 mm., stigma capitate. Type specimen: Ferreyra no. 5296, in the Traub Herbarium, acc. no. 106,

RANGE.—Peru; Infiernillo, between San Mateo and Oroya, Dept. Lima. Alt. 3300—3400 m., on stony soil.

NOTES.—Collected by Ramón Ferreyra on January 17, 1949 for whom the species is named. It differs from *Stenomesson humile* (Herb.) Baker in having a bulb with a very long neck, leaves contemporary with the flowers, relatively longer peduncle and spathe that is connate below and above the slit from which the flower extends. According to Baker the flower of *S. humile* is orange red. Ferreyra indicates the flower of *S. Ferreyrae* as "red."

Stenomesson humile (Herb.) Baker. Recently this little known plant was again collected by Dr. Ramón Ferreyra [Ferreyra no 5263; accession no. 123 in the TRAUB HERBARIUM; Peru, between Junín and Oraya, Dept. Junín, (habitat) "steppe of grasses (plateau)," alt. 4100—4200 m.; flowers "red"; 1-10-1949.]

Pax [Engler, Bot. Jahrb. 11: 324, pl. 7, f. 1—4. 1890] apparently was not familiar with the extreme variations in the genus *Stenomesson* Herb., and again described our plant as a new species, *Crocopsis fulgens* Pax, the type of the monotypic genus *Crocopsis* Pax, not knowing that this species is con-specific with *Stenomesson humile* (Herb.) Baker. *Crocopsis* Pax is therefore a synonym of *Stenomesson* Herb.

It should also be mentioned that the habitat of *Crocopsis fulgens* was erroneously given as "Reg. Argent." in the Index Kewensis, suppl. 1 page 116. 1901—1906, and that the name *Crocopsis argentinum* Kew Index (l.c.), non Pax (1890), was published by mistake, and that this name is a synonym of *Crinum argentium* Pax.

Kraenzlin (Engler, Bot. Jahrb. 40: 237. 1908) again described our species as new, under the name *Stenomesson acaule* Kraenzl., which is also a synonym of *Stenomesson humile* (Herb.) Baker.

3. GENETICS AND BREEDING

AMARYLLIS OF TOMORROW

WYNDHAM HAYWARD, *Florida*

In no field of ornamental horticulture today is there a greater need for scientific breeding experiments than in the case of Hybrid *Amaryllis*. In spite of the wonderful results achieved to date by the *Amaryllis* hybridizers of the world, the improvement of strains and quality and character of flowers may be said to have reached almost a standstill, having attained a high degree of perfection through old-fashioned "natural" methods.

Fig. 15. *Amaryllis belladonna* var. *barbata*, white. Photo by Wyndham Hayward.

In the early 1800's, there were primitive hybridizing attempts, using the species material then available, the scope of which may be judged by the writings of such pioneer plantsmen as Dean William Herbert in his AMARYLLIDACEAE, of 1837.

In the beginning, it was the custom to name every new hybrid, but for one reason or another, usually the failure to maintain a good stock of the new hybrid, or to increase the same adequately, the bulbs were lost.

The so-called "Johnsonii" is possibly one major exception. Whether the bulb now grown by thousands in Southern gardens of Louisiana, Texas and Mississippi is a true descendant of the original "Johnsonii" would require considerable research and more time for study than this writer has been able to give the subject recently.

"Johnsonii," the original hybrid, however, was pictured in some of the early literature, and according to the best reports, the "St. Joseph's Lily" of the lower Mississippi valley area is "at least" a sixth or seventh generation seedling of same.

"Johnsonii" as we know it today, has at least three major advantages which all hybrids should have to last. Reasonable vigor, good color and form, and ability to maintain itself by seed or natural offsets. The "St. Joseph's Lily," beloved to the hearts of the Louisianians, has a bright crimson flower, with distinct white striping part way down the keel of each petal, and grows well in the sandy to clay type soils of its favored area. Some thousands are growing in beds on the State House lawn in Baton Rouge.

In cultivation, "Johnsonii" grows slowly, and multiplies gradually, but thrives and survives. That is the main thing, and with its dependable blooming character, once it is well established, and its bright coloring, accounts for the wide popularity of the bulbs. The ordinary hybrid *Amaryllis* would not perform as well under such conditions. Fancy European stock, from the leading English or Dutch hybridizing firms, would die out, for the most part, in a year or two in the open in Florida, Louisiana or Texas under the hot summer sun.

The Mead strain of Florida would do better, and so might the bulbs of the Howard & Smith and the Rice strains of California origin. These are all outdoor-grown stock, brought to maturity in the open air under the hot summer sun of Southern latitudes which most of the imported greenhouse stock cannot withstand.

As can be seen from the use of thousands of the bulbs of *xAmaryllis Johnsonii* on the state house lawn in Baton Rouge, the possibilities for outdoor garden planting of *Amaryllis* surpass all imagination in the South and similar warm climate areas, if vigorous and thrifty varieties could be obtained which would "stand the gaff" as well as "Johnsonii" does in Louisiana. In Florida the "Johnsonii" does not seem to be as popular nor does it perform so well in garden culture, possibly due to some liking for a heavier soil than the usual light Norfolk sands of the peninsula.

However, here in Central and South Florida we have *Amaryllis belladonna* var. *maior*, a sand-loving bulb which is to be found by the thousands, maybe millions, over the state, nowhere cultivated carefully, but "thriving with neglect" as it were, and producing its lovely orange-red blossoms near Easter in springtime year after year, with no feeding or watering and often no cultivation beyond a weeding now and then. The White Belladonna Lily, *A. belladonna* var. *barbata* (Fig. 15) has not maintained itself outdoors.

Now here are two chances for the start of some good *Amaryllis* hybridizing. *xAmaryllis Johnsonii* in the form which is available in Louisiana gardens (it is only occasionally found on bulb lists) will set seed. The writer determined this definitely in spring of 1949 with some bulbs at Lakemont Gardens, Winter Park, Fla., crossing the flowers of "Johnsonii" with Mead strain pollen parents. The seed pods of "Johnsonii" were ribbed and dark green in color. "Johnsonii" is supposed to be a cross of *A. vittata* and *A. reginae*.

Fig. 16. *xAmaryllis* scape with seven flowers; grown by a friend of Maj. Pam in England, 1941.

Amaryllis belladonna var. *major*, is a shy seeder, but can be made to set a few seed, and the pollen is fertile on plants of the hybrid *Amaryllis* of the Mead strain. The writer has grown several seedlings of *A. belladonna* var. *major* parentage crossed with hybrids. The flowers were interesting but no improvement on either of the parents in quality of flower, and at the time, that was all the writer was interested in determining, and so the bulbs were subsequently lost, through neglect. However, it would have been a valuable thing to have tried the bulbs in a

sandy loam culture such as suits the *A. belladonna* var. *major* parent so successfully with no feeding or watering beyond the gift of nature.

So far as known, *Johnsonii*, *belladonna* var. *major* and a few types of *A. striata* (syn.—*A. rutila* and its varities) are the only "species" or "large-flowered" types which have maintained themselves over a period of many generations in gardens in the United States. It should be determined whether in Latin America there are other species which have similarly become established in gardens. The blooms of these three are by no means "large flowered" in the sense of comparison with the showy greenhouse hybrids, but are much larger than the miniature-flowered species of Chile, as *A. advena*. These latter, so far as known will not hybridize with the large flowered types, but this also needs more study.

From the preceding it will appear how poverty-stricken American horticulture remains in the matter of species material for use in hybridizing experiments. There are at least 75 species and varieties growing in the wild of Latin America, Brazil, Peru, etc., which might prove of value to modern hybridzers working with the Hybrid *Amaryllis* now that the craze for "larger and larger" flowers of a flat pansy shape seems to be passing. Now we also want miniature types, small-flowered *Amaryllis* as well as the large, rounded petal types, star-pointed flowers, trumpet shapes, and all the other possibilities.

Among Hybrid *Amaryllis* there exists the possibility of numerous flowers on a stem. This is shown in the accompanying photograph which was kindly supplied to the American Plant Life Society some years ago by Maj. Albert Pam, of England, one of Britain's great amateur Amaryllid enthusiasts, who has carried on the tradition of William Herbert and Arthington Worsley into the horticulture of today. The multiple blooms [Fig. 16] in Maj. Pam's photograph (which shows a plant bloomed by one of his horticultural friends) would be out of place on a giant-flowered hybrid of the fabulous greenhouse types, which are jammed to the limit atop the scape with a mere four flowers. There would be no room for more on such a plant. But in the case of trumpet shaped flowers as *Johnsonii*, *A. elegans* (the *A. solandriflorum* of years back) and *A. ambigua*, a very attractive but dubious species from Brazil and Peru, there is certainly room for more than the usual four blooms. On such plants seven to nine might be interesting and effective, opening a few at a time.

The umbel of *A. elegans* is described as 2—4-flowered, so it could be improved in this regard by judicious crossings. Occasionally in the Mead strain there will be found bulbs with upwards of four to nine flowers occurring in large plantings at rare times. Whether this factor of multiple bloom is inherent in certain hybrid strains or clones remains to be seen.

The small-flowered *Amaryllis* development offers the possibility of rich rewards for the successful hybridizer both in fame and monetary return, as the Dutch growers who are already offering some "Rutila Hybrids," are holding their limited stocks for high prices, $5.00 to $75 per bulb according to the quality and types, as the writer understands.

The species [Fig. 17] *A. striata* (syn.—*A. rutila*), offers the noteworthy character of easy propagation by either seed or offsets. *A. striata*

Fig. 17. *Amaryllis striata*, light red, two bulbs in 6" pot, grown by Frank Vasku, Winter Park, Fla.

bulbs of several varieties as found in American homes and gardens (these are very seldom found in the trade) make a great increase by bulbils or

offsets when well grown, and seed well, in addition. Their growth is slow, but steady. Flowers of *A. striata* in some varieties are small, the writer having one type of *A. striata* (var. *crocata*) which blooms from a bulb no bigger than a large hickory nut, say 1½ inches in diameter [Fig. 18]. This plant and its congeners offer tremendous possibilities for the development of "Baby" *Amaryllis*.

The latest developments of the Dutch growers in the "Rutila Hybrids" reportedly include self reds and salmon pinks, etc., quite com-

Fig. 18. *Amaryllis striata* var. *crocata*. Photo by Wyndham Hayward.

parable in form and color to the large flowered hybrids, but of less than half size, eminently suitable for table decorations and vase use. Here the possibilities are almost without limit. The bulb purchasing public would undoubtedly take to its arms anything worth while in this line which might become available in quantity, with thrifty growth character and good quality of the miniature flowers. The *A. striata* bulbs have the added advantage of blooming naturally in January and February in conditions of moderate warmth as during a normal Florida winter or in the greenhouse. This would advance the natural blooming period of the new hybrids similarly, in all probability.

A glance at the plates of *Amaryllis Leopoldii* show a striking possibility for the development of large star-shaped flat-faced *Amaryllis* flowers which would be a decided novelty in the horticultural world. The tendency for many years has been toward flowers as round as a dinner plate or super—giant pansy, and almost as monotonously similar, one to another. This discussion is to point out again the need for reintroduction of old time and later *Amaryllis* species so that the modern hybridizers may have this valuable plant "germ plasm" in variety to use in their efforts, guided this time with all the advantages of modern knowledge of plant physiology and genetics.

Genetics may also come in handy in the development of better things

Fig. 19. *Amaryllis Reginae* var. *Alberti*.
Photo by Wyndham Hayward.

in the ordinary Hybrid *Amaryllis*. Possibly the "Hybrid Corn" breeding plan could be done with Hybrid *Amaryllis*, using an inbred strain of "reds" from one grower, say an English strain, and crossing with an inbred strain of "reds" or some other set color, from a Dutch stock, or at least one quite distinct in parentage for many generations back. This would be eminently possible in Europe where breeding of the *Amaryllis* in "separate shades" has arrived at a high degree of success, 90 per cent or more of separate shade seedlings apparently coming true to color in the stocks of leading Dutch growers.

We need to know more about the factor of inbreeding of hybrid

Amaryllis, why it does, if it does, make the strain weaker. It might be that certain types would come admirably true from self-pollinated seed. Apparently *A. striata* var. *fulgida* and other varieties of *A. striata* do, in the writer's personal experience, although experiments are still too young to have brought any final considerations.

The ideal of the large-flowered Hybrid *Amaryllis* would be a multiplicity of forms, including double-flowered forms [Fig. 19], thrifty root growth and handsome foliage, hardiness to cold and ability to stand more or less abuse in cultivation, either outdoors or under glass, adaptability to various soils and conditions, free-blooming qualities and at least four flowers to the scape. The ideal Hybrid *Amaryllis* of the future may be large or small, but should make abundant offsets naturally, in the course of time, which can be grown on to maturity in their turn with reasonable speed and facility. This would assure increase of stock without bulb-cuttage, and maintenance of a commercial supply of desirable types when obtained.

The Hybrid *Amaryllis* of the future should have a blooming period from January to May, with possibility of forcing in November and December. Possibly the fall-blooming species *A. reticulata* and *A. aulica* will have something to offer in this regard. Certainly *A. striata* will advance the bloom period some weeks over normal. Types should be developed especially for growing in pots, which adapt themselves easily and successfully to this culture as do the *A. striata* species and its varieties. Some of these have been known to have been maintained in old families in Eastern United States for more than 75 years as treasured pot plants for the house, with bulbs being removed from the pots and given to neighbors and relatives as they multiplied to overflowing.

Tougher garden types should be found which will accept the same garden conditions as "Johnsonii" in the middle South and *A. belladonna* var. *major* in Florida. A strain of pure whites of thrifty growth would be a highly desirable factor in every project to increase the popularity and use of Hybrid *Amaryllis*. At the present time the pure whites are rather weak and un-thrifty, and last only a season or two with their new owners. *Amaryllis* bulbs are not like tulips and hyacinths, which "run out" after a few years in the garden . . . . with good care the life of a thrifty *Amaryllis* bulb has almost no limits but those of time and fortune.

The day is gone when one or more growers can dictate to the world of *Amaryllis* lovers what they shall grow and the types of flowers and plants they should have. The garden and flower enthusiast of the future will desire all kinds and will cherish them for their artistic merits and decorative charm, whether flat and flaring flowers or trumpet-shaped, round- or star-shaped in form. There is room for the admixture of every type of *Amaryllis* flower form found in nature in the *Amaryllis* of tomorrow. The greater the variety the better. From increased variations will come a greater field for the future fixation of new kinds in every way.

AMARYLLIS REPORT, 1948—1949

HERMON BROWN, *Chairman, Amaryllis Committee*

In January 1949, we had some of the coldest weather that I have experienced in California. The ground remained frozen from one day into the next. I had thrown a furrow over my *Amaryllis* bulb rows, but

Fig. 20. Hermon Brown *xAmaryllis;* (upper left), light red; (upper right), pure white, with greenish throat, and pink picotee edges and spots; (lower left), light red; (lower right) very dark red—consider only flower shape because koda chrome gave incorrect color value.

many of the larger bulbs had the bulb-necks exposed and were killed. A smaller proportion of the field grown bulbs which were more deeply covered did survive. My breeding stock was in the greenhouse and were all saved.

The blooms in the greenhouse in many cases were not up to the usual high standard, but I had some very fine ones in the field. The consistent breeding program of crossing only the very best is bringing outstanding results. In most cases I cross like on like which intensifies the desired characters, but I also supplement this by following the recommendation of Dr. Traub of mixing the pollens from various high quality plants in order to obtain a maximum of new combinations with which to work in the intensification program. I rate my bulbs on a scale of 100

Fig. 21. Double Hybrid *Amaryllis* clone HELEN HULL; brilliant orange red with white keeling. Photo McCann Nursery, Punta Gorda, Fla.

points, and do not save seeds from any that rate less than 90, unless I wish to bring in some new character, from any rating lower, not found in the best selections. The refining process then proceeds according to the regular program.

I wish there were more growers near here so that we could get together on a rating program, and also to standardize the descriptions of the best selected clones.

The illustrations (Fig. 20) are from kodachrome prints and I hope that they will serve to show at least the form of some of the recent selections.

McCANN DOUBLE AMARYLLIS

E. J. McCann, *Florida*

The strain of double *Amaryllis* here discussed was originated by my father, the late Captain J. J. McCann, some years ago by crossing the double *Amaryllis Alberti*, of Cuban origin, with single-flowered hybrid *Amaryllis*. From the original cross six double-flowered clones were obtained, four of which were discarded as inferior. Since the double clones

Fig. 22. Field of McCann double *xAmaryllis*.

do not set seeds, pollen from them was transferred to single hybrid *Amaryllis* to obtain the second and succeeding generations of hybrids.

The two original clones were very beautiful, and are still among the favorites today. One, a delicate shade of pink, veined white, has been named,—Mary McCann. Another, a solid brick red with ruffled edges, has been named.—Madira Bickel, Past President of the Florida Garden Clubs. The outstanding clone of the second generation has been named, Helen Hull (Figure 21) in honor of the popular officer of the National Council of State Garden Clubs. The flower is a beautiful orange-red, delicately shaded, with white keeling. It is also the largest-flowered clone, the flowers measuring up to nine inches in diameter. It is a prolific grower and multiplier.

Another second generation clone has been named,—Capt. McCann. It is dark red, with white keeling, and is also very prolific.

The best of the third generation has been named,—Edlena. This is a small-flowered clone with pink and white tepalsegs, keeled white.

The above are the clones that will be offered to the trade. A mixture of un-named clones will also be offered. I have others of the fourth generation that have reached blooming size. The fifth generation is in the small seedling stage. I have selected fifteen clones in all, but hope to reduce the number to about six or eight for extensive propagation. I have about 50,000 bulbs, both large and small, including about 10,000 blooming-size bulbs to be offered to the trade this season (Figure 22).

[Editorial Note.—See also article on McCann double *Amaryllis* by the late J. J. McCann, father of E. J. McCann, and Plate 65, in 1937 Herbertia, pages 185—186.]

HYBRID AMARYLLIS IN ILLINOIS

Carrie M. Armstrong, *Illinois*

Although I have grown *Amaryllis belladonna* Linn. (syn.—*Hippeastrum equestre* Herb.) as pot plants ever since I can remember, it was not until 1937 when I became a member of the American Amaryllis Society (now the American Plant Life Society), and they sent me some seed to try out that my real interest began. On July 10, 1937, I received 130 *Amaryllis* seeds from the Secretary. I planted them immediately in a flat. I put a layer of charcoal and oyster shell in the bottom of the flat and covered with good garden soil, then a layer of sandy soil was added to lay the seeds on. I placed the seeds flat on this soil close together, almost touching each other. I then put a thin covering of this sandy soil over them and sprinkled some fine coal dust over all. I placed the flat on a north porch and covered the flat with a damp cloth. When the cloth would get dry I would dampen it again and put back on or sometimes I would merely sprinkle the flat without removing the cloth. Any way, I kept a close watch that the soil did not become too dry and on the other hand I watched that I did not get it too wet.

Before the first of August the seedlings began to put in an appearance and I removed the cloth for good. I did not transplant these seedlings until November 22. This time I put a layer of crushed rock, peat moss, sand and some charcoal in the bottom of the flat and used a deeper flat. The soil I transplanted them into was made up of 2 parts garden soil, 1 part well rotted cow manure, 1 part sand, with some crushed oyster shell and a few crushed egg shells mixed through the soil. At this transplanting I had 92 seedlings averaging about one half inch in diameter. I let them grow in this flat on the porch as long as possible and by December 10 these seedlings had 3 leaves about one foot tall. But as I had no room for them in the living room I had to put them in the basement until spring. In the spring I transplanted them into a cold frame using much the same soil I had used in the flat.

This summer in the cold frame these seedlings grew an enormous amount of offsets, much to my apprehension, for I felt it would retard their blooming, which I suppose it did. They made a very thrifty growth this summer and I left them in the frame as long as the weather would permit but dug them before their foliage had been touched with frost. This second winter I stored them bare rooted in the basement.

In the spring their third year I planted them in the open ground. Our soil is a clay soil on which we use lime rock as needed and fertilize with cow manure. This year I began to reap the rewards of my labor for I had quite a few blooms and my enthusiasm grew by leaps and bounds. I only wish the men who donated these seeds could know the joy and pleasure they have given me. Each year it seems I see new beauty in them. My 92 seedlings have increased to hundreds. Many of the blooms measure eight inches across the face of the flower and some even up to 9 and 9½ inches and of course there are plenty of the smaller ones too. It is so interesting to try to guess the parentage of these bulbs for I have long necked bulbs, short necked ones, twin bulbs, large bulbs and small bulbs and apparently no two exactly alike of the original 92 seedlings. I kept a record of how I took care of these seeds but it seems I've been too busy taking care of these *Amaryllis* to find time to write about them. None of the credit for these *Amaryllis* belongs to me but rather to the American Plant Life Society. I have been doing some crossing of my own but have yet to see what my own efforts will amount to.

HYBRID AMARYLLIS—VAN MEEUWEN SUPERIORA AND GRACEFUL CLONES

George Alders, *Pennsylvania*

Amaryllis are gaining considerable popularity. We believe that the new so-called Dutch Hybrids have done much to help this magnificent bulbous plant to gradually gain its rightful place among the plants cherished in American homes.

G. C. van Meeuwen & Sons, of Holland, for many years cultivated, besides their large selection of miscellaneous bulbs and plants, a fine collection of Hybrid *Amaryllis*. Although they did extensive selecting under the old method of propagating from seeds, it was very difficult to produce and maintain true colors in such a strain.

Therefore, when Dr. Ida Luyten, connected with the Dutch Laboratory for Plant Physiological Research at Wageningen, Holland, and American workers, developed methods by which *Amaryllis* can be propagated successfully by vegetative means, van Meeuwen seized the opportunity and adopted the new method for the propagation of superior hybrid *Amaryllis* clones. The method was especially valuable because they possessed a large stock of good hybrid *Amaryllis* clones. A modern range of greenhouses was built and the breeding, propagation and cultivation of hybrid *Amaryllis* was undertaken under the most favorable conditions.

Extensive cross-breeding and selection had developed a stock of hybrids which were named the van Meeuwen Superiora Hybrid *Amaryllis* clones. These clones are very free-flowering, two or three scapes per bulb, usually each scape with four flowers. They are known for the very large and beautifully shaped flowers, and the extreme ease with which they can be forced into bloom, both in the living room and in the conservatory.

Although the efforts to produce newer and better hybrid *Amaryllis* by breeding methods is still being continued, van Meeuwen is making available the highest quality clones produced to date by propagating these in quantity by vegetative means. The outstanding advantage of this is at once apparent because the purchaser gets exactly the clone described and ordered. This could not be guaranteed by the method of reproducing mixed strains from seeds.

These quality Hybrid *Amaryllis* clones can also be offered to the public pre-treated so as to flower earlier. Mindful of the fact that Hyacinths, which normally could not be forced into bloom until the middle of February, but which by a special treatment could be forced into flower by Christmas, they figured that the flowering season of *Amaryllis* could be advanced in a similar way. Therefore, following the instructions of the Dutch Laboratory of Plant Physiology, they developed a method by which *Amaryllis* can be treated so that they may be had in bloom by Christmas also. The treated *Amaryllis* are known as the "Hearld Brand." This early-flowering brand of *Amaryllis* has enlarged the usefulness of *Amaryllis* to a very marked degree. Around Christmas time especially, the potted blooming plants of the red clones are very welcome and are very much in demand. Because of these outstanding qualities and features, these clones have gained world-wide renown.

The following is a list of clones available, with color descriptions:

Fabiola, light red.
Lucifer, orange red.
Dr. Faustus, brilliant red.
Snow King, pure white
Rose Queen, pink with white center.
Purple Queen, purple-red.
Queen Superiora, dark red.

In order to add variety, van Meeuwen intends to offer the flower loving public a new strain of hybrid *Amaryllis* in the near future. These are vegetatively propagated and have been named the Graceful hybrid *Amaryllis* clones. This strain has the same qualities as the Superiora clones, it is very free-flowering and has small velvety red flowers. The whole plant is a small replica of the larger Superiora clones.—everything in the right proportions. They will be suitable as cut flowers and for decoration, and because of their size, as house plants.

The series of Graceful hybrid Amaryllis clones was originated by Mr. H. Boegschoten, a private gardener for Mr. J. C. Bunge, one of Holland's leading industrialists and merchants. Several years ago Mr. Boegschoten decorated the tables of his employer for a dinner party with *Amaryllis striata* (syn.—*Amaryllis rutila*). When the decorations were finished, Mr. Bunge complimented his gardener on their beauty, but remarked that they would have been still more outstanding if the flowers

Annegatie Van Mossum's Tuinstuin
Hommage of the flowers — to Holland

had been altogether red without any green in the throat of the flowers. This chance remark stimulated Mr. Boegschoten to make the attempt to develop hybrids with these qualities. After 25 years of cross-breeding and selection, he succeeded in developing a small flowering series of *Amaryllis* clones that has pure red flowers. In several shows in which this strain was exhibited, the judges as well as the public were enthused about these beautiful flowers. The Weekblad voor de Bloemisterij (Weekly for Floriculture) reporting on the Flower Show of the Royal Dutch Agricultural Society held in March 1946 at Artis, Amsterdam, Holland, stated with reference to the exhibit of the Graceful hybrid *Amaryllis* clones by Mr. Boegschoten:

"It is regretable that no bulbs of this new series of hybrid of *Amaryllis* clones are for sale. Undoubtedly several cut flower growers would be pleased if they could purchase some of these new *Amaryllis* clones which would make a fine addition to the existing assortment of cut flowers. The only way out for those interested in this type of *Amaryllis* will be to develop a similar strain by cross breeding. It is a long way, but there is no other."

To make a long story short, van Meeuwen finally succeeded in changing Mr. Boegschoten's mind, and purchased the entire stock of the Graceful hybrid *Amaryllis* clones which will be introduced in the near future.

A SECTORIAL MUTATION IN xHEMEROCALLIS

Mary G. Henry, *Pennsylvania*

On an old farm adjoining my home there is a great mass of *Hemerocallis fulva* over 60 ft. in diameter. It is on a gently sloping hillside and for many, many years, when in bloom, it has provided a sight not easily forgotten. The owner of the farm, aged 94, died 13 years ago. Her husband's great grandfather lies peacefully beneath the *Hemerocallis*, undisturbed, let us hope, forever.

When I came to Gladwyne 22 years ago and saw this grand display of flowers, I learned to love, admire and respect the Daylily with enthusiasm.

Dr. Stout's marvellous new creations began to appear about this time. I acquired his wonderfully enlightening book "Daylilies," so necessary and inspiring to a Daylily lover. As soon as available I purchased a number of his superb new varieties.

A few years later, in 1939, knowing of my interest in Hemerocallis, Dr. Stout invited me to inspect his garden of Daylilies in New York. He then gave me the bright and beautiful litle red Daylily, which I named "Port," in memory of the youngest of my three sons. It was his favorite nickname.

The colors of these new Daylilies, especially the warm velvety reds and entrancingly lovely pinks, simply thrilled me.

During the years that followed, I had the fun of crossing a number of them and I raised some beautiful seedlings.

One morning this past summer I was amazed to see on a stalk of one of these seedlings a flower that was half red and half yellow. Another flower colored similarly expanded a few days later.

My great surprise came when two perfect flowers opened on the

Fig. 23. Sectorial mutation in *xHemerocallis;* one flower red; and one flower yellow on same scape. Photo by Josephine Henry.

same stalk, one a fulvous red and the other an even shade of pure butter yellow! The flowers were well formed, of a nice size and the coloring of each was unsullied by even a hint of any other color [Figure 23].

There were a number of other scapes on this plant but only the one showed this sectorial mutation. It will be interesting to see if this break in color will be repeated another year. It gave such a pretty and unusual effect and the flowers made me think of huge red and yellow butterflies hovering over the green leaves.

4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

GROWING AMARYLLIS IN MARYLAND

W. R. BALLARD, *Maryland*

The *Amaryllis* seem to be one of the most satisfactory flowering plants for winter blooming in the house. At various times the writer has bought a few of the better hybrid strains and a considerable number of seedlings have been raised. Since space in the house is not available for handling many plants in bloom at any one time, a system has gradually been evolved which works very satisfactorily.

In the spring all bulbs are planted out in the garden in well prepared and heavily fertilized soil. Pulverized sheep manure with additions of some phosphate has been used rather liberally. Bulbs are kept growing throughout the season until the frost period when they are dug and dried off. After the bulbs have been cleaned, they are put into flats and placed in the furnace room where the temperature is fairly high. In a few weeks the flower stalks begin to make an appearance and only those bulbs which show indications of blooming are potted up. These are kept in a cool basement for rooting and as the flower stalks begin to develop, a few at a time are brought into a sunny window where the temperature stays at 70 degrees or slightly higher. Under these conditions the flowers come quickly into bloom. When the bulbs finish blooming they are again returned to the basement and others are brought in for flowering.

This winter (1948-49) 58 bulbs developed flower stalks, some producing as many as two. The number of flowers per stalk ranged from two to four although one bulb had five flowers on one stalk. An attempt was made to keep an accurate count of the number of flowers but after more than 100 had appeared the count was lost but it is quite probable that the total was close to twice that number. The season of bloom started the last of December and ranged well into March.

One strain, of which a number of seedlings have been raised and which has been identified by Dr. Traub as *Amaryllis striata* hybrids, has multiplied very freely, and is almost a sure-fire bloomer. Many bulbs only an inch in diameter produce flowering stalks. Some of the highly bred sorts purchased have not been very good performers. They seem to be temperamental when it comes to blooming and, even when given good cultural treatment, many bulbs seem to deteriorate. It is understood that some types require more lime in the soil than others, and it has been suggested that some forms may be subject to attacks of nematodes.

Some crosses have been made between the other better flowered hybrid forms and the more vigorous *Amaryllis striata* hybrid strain which

propagates so readily. It would seem that if these characteristics could be worked into those with the more beautiful flowers, a great impetus could be given to a wider acceptance of the *Amaryllis* as a blooming house plant for the winter season.

After the once bloomed *Amaryllis* bulbs are returned to the basement, they are kept growing as well as possible until time to set them into the garden. It would seem that this method might readily be adapted to the commercial production of *Amaryllis* bulbs in the north.

THE BLUE AMARYLLIS—WORSLEYA RAYNERI

Alta H. Meadows and Elaine Brackenridge, *Texas*

Since we are very interested in specie *Amaryllis* we are constantly adding to our collections of these and are always on the alert for new species and sources. We were first inspired to try locating and growing *Worsleya Rayneri* [Plate 15] from an article in the 1940 Herbertia. Mrs. Meadows belonged to an *Amaryllis* Round Robin at the time directed by Mrs. R. S. Strout of Kentfield, California. Since Mrs. Strout was busy with other importations for the entire group of *Amaryllis* Robins, she turned over to Mrs. Meadows, who had assumed directorship of one of the Robins, all the information and possible sources of *Worsleya Rayneri*. Having written and located bulbs which could be obtained in Brazil, Mrs. Meadows and Miss Elaine Brackenridge placed an order and the bulbs were delivered in San Antonio in August 1948. They were then sent to the various ones interested in trying to grow these seemingly difficult bulbs.

The fact that they may be grown and brought to flowering without greenhouse treatment has been established by this importation and we feel that the following reports on the treatment given these bulbs may be of benefit to others interested in growing them. We understand that *Worsleya Rayneri* is the type of a monotypic genus, and that the species has never been known to cross with hybrid *Amaryllis*. With the faint hope that an exception may be made we have tried and will continue to try all possible crosses both with hybrids and species.

Mrs. R. W. Coulson, Chickasaw, Ala., reports—"I planted my *Worsleya Rayneri* bulb in a 10 inch pot using a mixture of leaf mold and black sandy loam—very rich, about a third of the bulb was left above soil. It was kept outdoors the rest of the summer and fall under a large oak where it got full sun only a part of the day, was watered frequently and about every two weeks was given liquid fertilizer—sometimes hyponex, or chemical, but usually pulverized sheep manure. Of the latter a strong solution from which fertilizer was left on the soil. The pot is kept on a sunny south porch during winter and on December 21st, a bud was discovered. The flowers opened in January but unfortunately we were away at the time that they opened and they were almost past their prime when we returned. The color was definitely not blue. Ours was lavender and one had to use a lot of imagination to see any blue at all. There were 4 large blossoms and all four were closed within a week.

Worsleya Rayneri; reproduced from Plate 177, page 93, HERBERTIA, vol. 7. 1940.

Plate 15

The pollen was saved and on February 23, 1949, some of it was used on a Dutch white *Amaryllis* which opened."

Miss Willie Mae Kell reports from Wichita Falls, Texas — "The *Worsleya Rayneri* I have was sent to me by Mrs. Stout, October 9, 1948, after it had started growth for her so had some set-back to be disturbed at that time. It shows no flower bud as yet (Feb. 9, 1949) but it is growing, has 9 leaves, the top measurement being 27 inches. The potting mixture was leaf mold, sand, top soil, fertilizer and some charcoal."

Mrs. K. B. Anderson, La Canada, California reports — "I tried my *Worsleya Rayneri* for quite a while in a very sandy mixture and it did get some knobby looking roots but in the area of each root was soft rotting root plate which had to be scraped away frequently and each time the root seemed to be rotted too, so I finally soaked overnight and peeled away the whole corky part of root plate and re-planted in pure quartz sand in my hydroponies set up. Altho I haven't fed it chemicals yet until it gets roots nevertheless it has a nice top growth, 4 leaves, one dies when next one comes."

Mrs. R. S. Strout, Kentfield, California reports — "One of my *Worsleya Rayneri* bulbs has not rooted, started to rot so I scraped all the old part away, dusted with Semesan and planted surrounded with Vermiculite. The other also does not look as if it had rooted for it only has 2 medium sized leaves and the tips of the others are just putting out and it has never grown."

Mr. H. D. Hieronymus, San Antonio, Texas reports — "I planted my *Worsleya Rayneri* bulbs in a mixture of leaf mold, top soil, Colorado River (Texas) sand, a small amount of clay and broken pieces of sand stone mixed throughout. The pots were then placed outdoors under a large willow tree where the bulbs received morning sun. When the weather turned cold in October they were brought indoors and placed in a cool room. Shortly before Christmas one of these bulbs showed a bud but I made the mistake of bringing it to a warm room and the bud blasted. The other bulbs show no sign of buds but they have apparently rooted well and made healthy leaf growth. The leaves grow until they become long enough to droop over and touch the ground and then wither as a new leaf is coming from the center.

Miss Elaine Brackenridge, San Antonio, Texas, reports — "The three *Worsleya Rayneri* bulbs were about nine inches in circumference and 15 inches long, including the length of the long necks. All roots had been removed. The bulbs were immediately potted in 8 inch pots. A mixture of half sand and half leaf mold was used. Small pieces of charcoal were placed in the bottom of the pot to insure proper drainage. The pots were then placed in the deepest shade until considerable top growth had been made. They were then placed in light shade until late September. During this period they were watered as often as needed but no fertilizer was used. During October, November and December they remained in a deep box half submerged in the ground. During the day when weather permitted the top was left open, being tightly closed at night.

The three buds were first discovered during the Christmas holidays. One had already pushed up sufficiently from the center of the leaves for the entire bud and part of the stalk to be seen. Before many days passed, extreme cold weather set in. I was afraid they would freeze in the box outdoors so I moved them into a gas heated room in the house. The first scape of five buds did not open properly, but some pollen was saved and tried without success on several Dutch hybrid *Amaryllis* including a white and a pink. The *Worsleya Rayneri* pollen on PINK FAVORITE, a named variety from the Ludwig firm in Holland, formed a large pod about an inch in diameter. I returned home one afternoon to find the stalk bent over and badly damaged. Before long it began to die at the break. Upon examination of the partly formed seeds they were found to have been developing.

The second bulb that budded had six buds which slowly dried up and withered away. The third pot was placed again in the outdoor box where it produced four buds opening almost simultaneously March 13, 1949. They were a distinct cobalt blue-violet in color, with the throat white and flecked with the same shade, and the edges slightly ruffled. The buds remained open from Sunday until Wednesday when they began to close. The stigma was not receptive to self-pollination on any of them.

Next season I expect to leave the pots in the box outdoors all winter since they grew best there and withstood many nights of freezing weather. They seem to dislike the dryness of gas heat. At the present time I am giving weekly waterings and a weak solution of steamed bat guana.

Mr. R. Wade Vliet of Oklahoma City, one of our Robin members also received several of these bulbs and in turn distributed them to other growers in other localities. We understand that Mr. Vliet successfully brought his to perfect flowering but have been unable to obtain any other information about who received the other bulbs or the conditions under which they were grown.

Mrs. G. O. Meadows, San Antonio, Texas, reports — One of my *Worsleya Rayneri* bulbs was planted about 4 inches deep in pure leaf mold from live oak trees and the other was planted about half its depth in a rich black mucky sand from a sub-tropical soil area near San Antonio. Both had good drainage. They were then placed outdoors under oak trees where they received filtered sun light.

The one planted in the sub-tropical soil was watered more generously and although it never stood in water the soil was kept very wet. When the leaves, which grew quickly, were about 8 or 9 inches long, the bulb began to show signs of rotting at the top of the neck. The bulb was taken up but there was no sign of rotting on the bulb itself. It had short thick roots coming from the edge of the bulb plate. The top brown layers of the neck were peeled away to clean substance and the bulb re-planted scarcely 2 inches deep in leaf mold. Both were brought indoors late in October and placed in an un-heated room and in December a bud tip began to show on the re-potted bulb. The bud growth was slow but it had cleared the short leaves and was large and well formed with a

reddish lavender tinge beginning to show at the tip. Severe weather with the temperature dropping to below zero forced me to bring my plants to warmer quarters. The bud ceased to grow and for weeks was at a standstill. Though taken back to the un-heated room and regardless of any treatment given it eventually dried up completely. This change of temperature causing the bud to blast. Leaf growth on this bulb was slow although it was well rooted, evidence of the vigor lost through budding and it has not fully recovered yet, there are only 4 leaves measuring 3 to 10 inches.

The bulb originally planted in leaf mold rooted more quickly and has made a more vigorous leaf growth. The leaves average 22 to 24 inches in length with the outer leaves dying away as a new leaf takes its place, leaving a continuation of 8 to 9 leaves. There is no sign of a bud on this bulb although the neck has a swelled appearance.

Fertilizer used for both was liquid bat guano (steamed and processed) at the rate of 2 tablespoons to a gallon of water and applied about once a month.

Miss Brackenridge gave me some of the pollen from the first *Worsleya Rayneri* she had to flower and I used this on a pure white Dutch hybrid *Amaryllis* but the cross was unsuccessful. Of another cross made the *Worsleya Rayneri* pollen was mixed with pollen from PINK FAVORITE and applied to the Dutch white hybrid. The seed pod will be matured within a week (March 20) but what results will eventually be obtained from this remains to be seen. I doubt that any *Worsleya Rayneri* blood will be in the seedlings.

In closing we submit the following summary of our conclusions thus far in our experience with the *Worsleya Rayneri*. We will continue our attempts to cross them with *Amaryllis* species, in hopes that one will be successful. As Robin members we hope that this brief report will be of interest to *Amaryllis* fans everywhere and stimulate the cultivation and development of this lovely flower.

(1) Best rooting medium to be a mixture of leaf mold and sand.

(2) The bulbs will stand considerable cold. They did flourish in a cold frame type box during freezing weather.

(3) The bulbs dislike gas heat and dry atmosphere, preferring some moisture in the air.

(4) In all other respects including watering they have responded to the kind of care given to other *Amaryllis* including the Dutch hybrids.

THE BLUE AND IMMACULATE AMARYLLIS

A. B. LYTEL, *Manager*,
Las Positas Nursery, Santa Barbara, Calif.

In the 1942 and 1943 Herbertias reports appeared about the Blue Amaryllis, *Worsleya Rayneri* (syn.—*Amaryllis procera*, *Worslaya procera*) at Hope Ranch. It is of interest to note how this colony was affected by the low temperature of the past season (1948—1949).

Three of the bulbs bloomed in the fall of 1948. The frost during the winter (January 1949) damaged the foliage of most of them and killed a few. About twelve survived, and these were transplanted to another location. It will not be known for at least a few months how they will take to their new location.

In 1940 Herbertia, mention was made of *Amaryllis immaculata* (syn. —*Amaryllis candida*), when there were only a few bulbs at Hope Ranch. Now there are many blooming sized bulbs produced from seeds. This summer (1949) the older bulbs as well as the seedlings produced a fine show.

GROWING AMARYLLIDS IN MICHIGAN

WALTER ALLGEYER, *Michigan*

Here in Southwest Michigan we have both good soil, and a fair climate for growing of amaryllids. My interest in these various bulbs came some years ago, first in *Amaryllis* [Fig. 24, left], and some of its smaller cousins; then *Crinum*, *Hymenocallis*, *Clivia*, and the lovely *Haemanthus*.

There are several necessary requirements for growing these bulbs, and having them bloom freely. First, Patience; second, good soil; and third, care in planting, and growing. One must not force growth—give your bulb a chance, and let nature do its part. I plant bulbs in pots, and out in open soil, both are very satisfactory, and about equal in results.

The large blossoms can be hand pollinated, and the seed grows very easily in seed pans. In this the seedlings can be grown for the first year, and then planted out in open soil in summer, where they soon make fine bulbs. I have over 400 seedlings of all sizes, a few had bloom this year. In fall they are stored in the basement, with the larger bulbs.

For blooming size bulbs I always use a large pot, 7 or 8 inches, in which they will bloom and grow to good size, with plenty of root room. In pots they do best if set outside in summer in part shade, as the hot sun dries out the pot too quickly. I like to set them where they get only the morning sun. I do not let them dry out while growing, and in fall when the first light frosts come, I set them down in the basement to rest and keep them dry during storage. After they have rested

several months I take out part of the top soil, add fresh soil, and set them in a warmer place until the bulbs show signs of growth. Then I give some water, but just enough to moisten soil. When the bud stem has shown good growth, they will require more moisture, but after blooming, when the leaves are growing water is applied more often.

In pots bulbs should be set so that the upper half of bulbs is not covered, but in planting out in the open soil they can be fully covered. For larger quantities I plant them out in the open soil about the first week in May, and by mid-June they are in bloom—a good show. After blooming they are kept growing, irrigated if it gets too dry, and by fall they are plump, and ready for the next year's bloom. When the first light frosts come I take them up, and place them in large flats, in which

Fig. 24. (Left), pink *xAmaryllis*, flower 8" diam.; (center), *Hymenocallis caribaea;* (right), *xCrinum* clone LOUIS BOSANQUET. Photos by Walter Allgeyer.

I have about an inch of dry sand. The roots are spread carefully, and are covered with more sand. They are then ready to be stored in basement for the winter's rest. By spring the leaves will have dried, but the roots will be fresh, and ready for growth. In bulbs newly purchased, in most cases, you will find that all of the roots are trimmed short, or no roots at all. Such bulbs are harder to manage, and need time to start. Here one must have patience, and wait until the bulb shows signs of new life.

For Crinums we use a much larger pot, as they have a larger root system; so I use old discarded 8 or 10 quart enameled kettles, with holes in bottom for drainage. In such a kettle *C.* CECIL HOUDYSHEL had its first bloom July 21, and a second Aug. 14. *C.* LOUIS BOSANQUET [Fig. 24, right] had the first bloom July 16, a second July 30, and a third Aug. 16, making a new flower stem about every two weeks.

Crinum asiaticum, in a larger wooden tub has at this time, Oct. 24, its first bloom. Rather late, but safe from frosts, for it can be taken inside on cold nights.

Cooperia, *Chlidanthus*, *Habranthus*, and *Zephyranthes*, the smaller Amaryllids, are lovely during the summer and fall, and are planted out in the open soil, where they can grow and multiply. These are not hardy, and are taken up in late fall, and put in pans of sand, where they can rest for the winter.

I plant *Hymenocallis* in large pots, or also in the 8 or 10 qt. enameled kettles, and they grow and bloom wonderfully. I have three varieties—*H. tenuiflora*, *H. caribaea* [Fig. 24, center], and *H. narcissiflora*. I find them easy to grow and bloom. I use the same soil as for *Amaryllis* and Crinums, and the same care.

Clivia and *Haemanthus* are new to me, and as they are strictly indoor plants, I have them in pots, where they will be cared for until they too put on their show in blossom.

Now a word as to soils is in order. I have a good supply of soil mixtures from which I can make up almost any mixture needed. First, barnyard strawy manure is placed in a large pile and left all winter. In the spring it is placed in a compost rack, about a five inch layer alternating with a one inch layer of soil until the rack is full. It is then left to rot into humus until the following spring when it is removed and stored for use. Second, a large truck load of leaves is brought in and left in a pile over winter, and is then placed in the rack in a similar manner, leaves alternating with soil layers. It too is left until it has turned into a dark leaf humus. Third, grass sod, about four feet square, grass side down, is left until all is well disintegrated into a nice sod loam. Fourth, a load of black muck is brought in. This gives me four soil mixtures to choose from, or to mix in any way desired. The four original mixtures are always available in barrels near at hand so that the mixtures can be conveniently made. I also have a supply of medium sand which is used to make the potting medium porous and soft.

My favorite mixture is as follows: 2 parts leaf humus, 1 part rotted sod, 1 part barnyard humus, and 1 part sand. This I mix up in a tub, and then store for later use.

I do not use any other fertilizer. Bone meal could be added to this mixture, but this is not necessary.

In general I find that good bulbs, good soil, with reasonable care will give fine results with any of these interesting subjects. I use large pots to give the roots plenty of room, and bulbs grow larger every year. In storing always remember that *Crinum*, and *Hymenocallis* must have a dry warm place, but *Amaryllis* will stand a cooler storing place.

My next year's adventure will be with a new bed 25 ft. by 30 ft. sloping gently toward the back. On this I will place some of the black muck, barnyard humus, and sand, spade deeply, and expect good results.

NARCISSUS NOTES, 1949

J. S. Cooley, *Maryland*

It is a real thrill to see the first *Narcissus* flowers opening in the spring. This year they bloomed at least a month earlier than usual. The *Narcissus* tops were emerging early in December. On account of the mild weather the soil was frozen for a relatively short proportion of the winter and root growth probably took place during most of the season. February Gold for once bloomed in February. It opened a few flowers several days before the early variety, The First. February Gold is very satisfactory here in this region. Although it is a small flower, it is early, a good rich color, a free bloomer and a good "doer." It has the added advantage of opening out full flowers in frosty weather when some other varieties have the stems frozen to death or do not open out full flowers. We need an early *Narcissus* having a flower as rich in color as Forerunner and blooming as early as and having as much resistance to cold as February Gold. Forerunner does not have as smooth a perianth as one would like, but it has other good qualities for an early variety. Any breeding program should have for one of its objectives the production of early bloomers.

This year was a good time to get information on the effect of cold weather on the opening of *Narcissus* flowers. This year's observation also indicated that the flowers of some varieties freeze to death while others in a similar location are not killed. On February 27 and 28 there was a snowfall of about 3 inches and the temperature was as low as 22 degrees F. Buds of February Gold and of The First that were well above the snow and showing color bloomed out good flowers. Only a few buds blasted. This temperature was possibly close to the lower limit for the tolerance of these varieties. The weather was cold up to March 22, the temperature going as low as 20 to 22 degrees several times since the blooming started. In any attempt, however, to state a minimum temperature one must always keep in mind the importance of the duration of the chilling condition. The flowers that opened under these cold conditions have been lacking in sheen and brilliance and the stems were very droopy. The stems of Ada Finch were so flaccid that the flowers drooped to the ground but when a warm day came (March 21 and 22) they straightened up. Whitely Gem bloomed in this cold period. It was not as sparkling as usual but the intensity of the red in the cup was much greater than in some other years when it happened to bloom in a warm spell of weather. Whitely Gem was in the early group this year. It is a free bloomer and a good "doer" here.

The little Jonquilla hybrids were as entrancing this season as ever. It seems strange that more gardeners do not use this group of *Narcissus* to enhance their pleasure in gardening. Some of this group such as the *jonquilla simplex* are very exacting in their cultural requirements and often pass out from one season to the next. The *jonquilla* hybrid, Orange Queen, is also in the class of poor "doers" and under my conditions

does not persist well. Some others in this group however are splendid "doers." I like very much a jonquil that was found growing in an old colonial garden in Maryland. It has persisted there for many years with little or no care. It multiplies fast so that it soon forms a thick clump but in spite of that it continues to bloom freely every year. It begins blooming as early as WHITELY GEM and continues at least a month. The jonquil hybrids may have small flowers, but they are usually a rich golden color and often very fragrant. They are useful both for prolonged garden effect and also for cut flowers for small arrangements. Flowers of jonquilla hybrids such as GENERAL PERSHING were injured by cold this year more than some other groups of *Narcissus*.

The red cup varieties have been unusually fine this year. This is perhaps due to the cool weather and an abundance of moisture. The weather was also favorable for the persistence of the red color of the cups. Warm sunny weather during the blooming time of red cup varieties may fade the red in the cups very soon after the flower unfolds. When the varieties that soon fade are to be used for cut flowers it is advisable to cut the flowers as soon as they open. Some of the red cup varieties fade much more quickly than others. This is therefore a consideration to keep in mind in evaluating promising seedlings.

This year has been very favorable for the development of fine foliage and one should expect fine bulbs for next year.

DAYLILY ADAPTABILITY

PHILIP G. CORLISS, *M.D., Somerton, Arizona*

All that I am going to say here, has been said many times before; but from remarks I heard on visiting gardens of Hemerocallis growers from coast to coast last year, I feel that we cannot lay too much stress on the fact that the performance of daylilies varies greatly in different climates.

Too often, growers in one location of the country scoff at the high prices or touted varieties offered by hybridizers of a different climate. It is true, however, that our hybridizers introduce varieties which truly are improvements IN THEIR GROWING CONDITIONS, over other varieties. Some such introductions will indeed prove to be inferior to older varieties WHEN GROWN UNDER DIFFERENT CONDITIONS.

There are many exceptions, but in general, it is agreed that varieties that are deciduous or dormant in winter do better in the north, while the evergreen varieties do best in the south. Some evergreen varieties do splendidly in the north if they are given protection; while some dormant types perform ably in the south.

Other facts to remember: (1) Varieties with Aurantiaca parentage are tender. They perform better in mild climates, and are often killed in the north; (2) The "species" perform poorly in mild climates, although there are many exceptions among their descendants.

If you are disappointed in the performance of some kinds of daylilies, see if they won't improve in a different location in your garden.

Many varieties fade badly in strong sun, while almost as many others are greatly improved in color by being in full sun. Consult the recommendations of your dealer, or the originator. Remember, too, that "full sun" in New England, where the percentage of available sunshine is less than 50%, is quite different from that in, let us say, Arizona, where over 90% of available sunshine occurs.

It is also a mistake to try to take too much advantage of the hardiness of Hemerocallis. Certain varieties will multiply and bloom in unfavorable positions under complete neglect, but tender fancy hybrids actually demand the best of food and drink for good performance. We hear frequently of the failure of some kinds to flower until they are relieved of neighboring shrubs or trees.

It is true that the modern Hemerocallis makes it possible to have a garden full of glorious color for almost all growing seasons. The color range is large; the height, size, pattern, and form of the flowers is varied. The requirements of the plant are simple, and its enemies and diseases are few. But it is still necessary to exercise intelligence in selecting and planting your Hemerocallis. Use plants that are suitable for your climate; give them a good bed, with proper sun, shade, food, and water. They will be happy with you, and you will be happy with them!

CORRECTIVE FOR POOR FOLIAGE IN HEMEROCALLIS

GEORGE GILMER, *Virginia*

I have discarded some daylilies for poor foliage. I had reduced my plants of SATURN and THERON on account of poor foliage in August and later. This year at the end of July I put some sulphate of ammonia around my plants. SATURN this year had as bright, nice green foliage as any one could want. The foliage on THERON is better than in any previous year. I kept the fertilizer at least four inches from the plants to avoid burning. I am going to try this in other years and hope it works as well.

SOUTH AFRICAN AMARYLLIDS AS HOUSE PLANTS

[CONTINUED FROM PAGE 130, PLANT LIFE, VOL. 5, HERBERTIA EDITION. 1949.]

SARAH V. COOMBS, *New York*

HAEMANTHUS (BLOOD LILY; SNAKESHEAD LILY)

There is an interesting quality about this genus. Some of its members, such as *Haemanthus Katherinae* [Plate 16] and the *H. multiflorus* [Fig. 25, from Tropical Africa], are quite beautiful. Others, with some beauty, have an odd attraction because of the way they grow. In South Africa, it always is intriguing to come on the thick, shining leaves of *H. coccineus*, lying spread out flat on the ground. They might be on an open sandy cliff among shrubs, and perhaps one looked across open ocean with only Antarctica as an unseen boundary. In somewhat deep woods they were equally happy but there was always something rather exciting about them, to this observer, at least. Just why, in another case, the one rather thick erect paddle-shaped leaf of *H. northieri* solemnly flapping back and forth in the wind should be amusing, I cannot tell. This species has a compact reddish tuft of flowers on a red stalk. In the Rain Forest at Victoria Falls one would come suddenly on a group of red-orange flowers in a little glade, flowers suggesting snakes with heads upraised in fright or menace. Perhaps the half-tame baboons playing around, with tricks put on for one's benefit, helped the feeling of strangeness.

There is a head of many flowers, usually red or white, crowded on the end of a stalk and surrounded by bracts which are often bright in color as are the stigma and the usually prominent stamens. Not many of this genus are available in the United States. One owner speaks of his twelve species but only four are found commonly in the trade. The *Haemanthus* have been cultivated in England for many years, from the 18th Century. It is grown there as a greenhouse plant.

Haemanthus coccineus Linn., MAARTBLOM (MARCH FLOWER), PAINT BRUSH. This species grows freely in the southwestern part of the Cape Province. It flowers before the leaves, which come in South Africa with the winter rains in June and July. The flower stalk with its cluster of flowers blooms there in February and March. The stalk is stout, sometimes spotted with minute dots of purplish-brown and about 6-9 inches in height, occasionally a foot tall. The flowers grow in an umbel about 3 inches across with 6-8 crimson bracts about 2 inches in length. The individual flowers on pedicels about $\frac{1}{2}$ inch in length, have a short tube and are bright crimson with linear segments and prominent stamens with yellow anthers. The flower is bright, though not so attractive as *H. Katherinae*. There are usually only two leaves, thick, tongue-shaped and shining, up to 2 feet long and 3-6 inches broad. The berries which follow the flowers are pinkish. This bulb must have a long rest. The soil should be light and sandy or gravelly with good drainage. It will like some peatmoss or humus but drainage is most important.

These bulbs, when planted in a pot, should be covered only to half

Haemanthus Katherinae, photo courtesy New York Botanical Garden.
Plate 16

their depth in one just large enough to hold the roots without overcrowding. A cool temperature, 55°-60° F. is recommended, even cooler if possible, when blooming, to make the flowers last longer. Plenty of water is needed when growing, less at first and when drying off. In

Fig. 25. *Haemanthus multiflorus;* photo Sarah V. Coombs.

growing from seed, germination is quick but only one seed leaf appears at first and the second leaf is very slow in coming. With *H. Katherinae*, the growth is different, germination is under the ground and a small bulb is formed there first, the seed leaf taking six months or more to appear thereafter.

Haemanthus Katherinae Baker [Plate 16]. This is the handsomest of these bulbs. It comes from Natal and the Trasvaal in the northern part of the Union of South Africa, nearer to the equator, and therefore needs rather more heat than the ones like *H. coccineus* from the Cape Province. It does not like strong sunlight or heavy winds. Its height is about 18 inches but it grows taller under cultivation. Leaves are 4-9 on each stalk, light apple green, 6-9 inches broad and perhaps as much as 3 feet long, pointed and deeply veined. The flower stalk is spotted and sheathing. This species blooms with the leaves on a different stem. The flower cluster is globose, 4-6 or in cultivation 8-9 inches in diameter. Spathe-valves 5-6, lance-shaped, soon withering. The filaments ascending,

Fig. 26. *Haemanthus tigrinus;* photo courtesy South African Railways and Harbours.

bright red, anthers yellow from pollen. The flowers are a lovely color, blood-red to salmon. The berry is bright red. The color of the flower has been described as "sunset pink." This bulb may be a valuable addition to house plants. It grows for a long time of the year being dormant for a time but never really losing its leaves. It should not be dried out entirely. It is a summer bloomer in the United States but may bloom later if water is withheld before starting. It needs more humus in the soil than other species except *multiflorus.*

Haemanthus multiflorus Martyn [Fig. 25], is included here, though it comes from Tropical Africa because it is one of the finest of these

[COOMBS—S. AFR. AMARYLLIDS, CONTINUED ON PAGE 41.]

PLANT LIFE

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GENERAL EDITION

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

PREFACE

The GENERAL EDITION of 1950 PLANT LIFE is devoted chiefly to the Fancy-Leaved Caladiums. Mr. Hayward contributes an important article on the subject in which he considers the plant habit, cultural directions, the history of *Caladium* breeding, propagation, and exhibition procedure. The Caladiums have been receiving renewed attention in recent years and Mr. Hayward's article comes at an opportune time.

Dr. Norton contributes an interesting article on the winter forcing of excised Jasmine twigs. This practice will serve to bring added cheer into the living room during the winter months. We are grateful to Dr. Norton for sharing his experience with us.

Mr. Hayward reports on the rediscovery in North Florida in the early 1930's of BARTRAM'S IXIA, a fine subject that had been lost to culture for over a century and a quarter. BARTRAM'S IXIA lends itself well to pot culture, and should be offered in the trade. This would be an insurance against its total loss since it is native to only a small area and is fast disappearing due to the inroads of civilization.

The attention of the reader is also directed to the PLANT LIFE LIBRARY, where some recent outstanding books on plants are briefly reviewed.

January 12, 1950

Hamilton P. Traub
Harold N. Moldenke

CORRIGENDA

PLANT LIFE, VOL. 6, 1949

Page 25, title, for "CESNERIACEAE" read "GESNERIACEAE"

Page 31 5th paragraph, 8th line, for "Mittsch" read "Mitsch".

Page 50, 3rd line from bottom, for "Obh." read "Abh."

Page 133, under II. Other Committees, for "GESNERIACEA" read "GESNERIACEAE".

Page 134, 5th line, for "1950" read "1951".

FANCY-LEAVED CALADIUMS

WYNDHAM HAYWARD, *Florida*

The Fancy Leaved Caladium, popular summer foliage plant for pots and garden beds both North and South, is receiving a new recognition by the American public which promises to send this colorful and decorative Aroid, lesser member of the group of tuberous rooted plants called "Elephant Ears," well on the way to leading popularity in the horticultural field to which it is adapted.

The caladium is related to such genera as *Colocasia*, *Alocasia* and *Xanthosoma*, and one of its best known cousins is the Taro of Hawaiian gardens. The name "Caladium" is reputedly of Indian origin and of doubtful meaning. The plants are grown for the beauty and high color of the well developed leaves, which rival the most brilliant flowers. The actual flower of the *Caladium* is rather inconspicuous, being a small calla-like affair, with a hood-like spathe, enclosing a spadix, of which the upper portion is covered with stamens, and the lower with the female flowers.

The plants grow from a tuber or corm underground, and bear a profusion of handsome leaves on relatively long, straight petioles. The leaves are more or less heart-shaped like the well known giant "Elephant Ear" types, used in bedding for many years in the North, often in the center of a bed of cannas. This giant Elephant Ear is usually described as *Caladium esculentum*. Various other related genera are grown for similar effects in the tropics and sub-tropics.

Caladiums are of easy culture, growing in spring from the dormant tubers in proper conditions of warmth and moisture, in rich soil, to perfection. The tubers are perennial and increase from year to year with good care. The original species, from which have sprung our modern showy hybrids in green, red, purple, maroon, pink, rose and white, are natives of South America, mainly Brazil and Peru. In the last 90 years they have been developed to a wonderful collection of highly colored varieties which are attracting an ever-increasing share of the horticultural interest accorded to bulbous things.

They have a personality, charm and appeal that is rarely met in garden material. One comes to know them like old friends, and to recognize familiar varieties without fail from year to year in the garden. There is the greatest variety and profusion of color and rich shades, all with backgrounds, borders or veinings of various tones of restful green.

Two of Florida's pioneer horticulturists were among the leading hybridizers of the modern caladium until their passing 10 to 20 years ago. The late Henry Nehrling, of Gotha, Fla., and Theodore L. Mead of Oviedo, Fla., contributed in a material way to the popularization and development of the choice varieties we know today. A number of their originations are still colorful standbys in our Southern gardens and the florists trade could scarcely get along without them.

Forty years ago at Gotha, Nehrling, who died in 1929, grew some 200,000 of the bulbs each summer in large ground beds under lath shade, with more than 2,000 named and separate varieties included among them as well as a varied crop of new seedlings under study. Besides his work with the large-leaved caladiums, Theodore L. Mead is remembered particularly for his contribution of "Arrow and Lance" varieties, as he called them, which are the pride and joy of fanciers of caladiums today, but still little known in the general trade.

These Arrow and Lance varieties [Plate 17] were obtained by crossing with narrow-leaved species such as *C. albanense* and *C. venosum speciosum*, which he received from English growers. They have come to be one of the great novelties of popular plants today and the trade has not been able to produce a fraction of the stock which will likely be required in years to come. They are slow growing and more delicately constitutioned than the large leaved types, for the most part, and tend to make smaller bulbs. But when better known and more abundantly available, they will undoubtedly prove to be a sensationally popular novelty. Active work in the hybridizing of new Arrow and Lance leaved types is being conducted in Florida at this time by several growers, including two Tampa women, Mrs. T. S. Freeman and Mrs. A. J. Weir, whose efforts have brought most interesting and attractive results.

One early Arrow and Lance leaved type, E. O. Orpet, credited to Nehrling, has attained a wide distribution among fanciers, and is believed to have been a major aid in producing some of the latest "breaks" for new forms and colors. E. O. Orpet was the first of the showy red-centered Arrow and Lance types, the other previous varieties in this group being largely marbled and veined in tones of green, creamy-grey and dark red. Hedwig Else Nehrling (Mead) is one of the early types, green with red spots on lance shaped leaves.

In the summer of 1949, an exhibit of the newer types of pink, crimson and wine colored Arrow and Lance caladium foliage received a Vote of Commendation from the Prize Committee of the Massachusetts Horticultural Society at their first showing in Boston. These were grown by the writer at Lakemont Gardens in Winter Park and shipped to Boston by parcel post. The Prize Committee suggested that some of the bulbs be grown another season at Boston by a pot plant specialist to exhibit them in top condition for further consideration for higher awards.

The familiar large-leaved types of fancy leaved caladiums will grow two or three feet tall, at best, usually about a foot to two feet in height when well grown, depending on care and varietal differences. The Arrow and Lance types are low growing, usually not more than a foot tall and some of the smaller kinds only a few inches.

With abundant food some caladiums will make a tuber up to two or three pounds in weight. The customary "bulb" as sold in the trade is an inch or two in diameter. Some varieties do not make large bulbs and have to be marketed with an explanation to the customer for this reason.

These small-bulb types include some of the best, most highly colored varieties, and showy window-pane varieties in some cases, which has caused them to be dropped from cultivation by the commercial growers in

favor of showy but less artistic types which readily make large bulbs, such as Sorocaba, Lord Derby, Keystone, Mme. Truall, etc., as found in the trade today. These are all effective, brilliant types at their best, however, and should not be neglected in any collection.

The matter of nomenclature in caladiums is highly confused as is

Fig. 27. *Caladium Humboldtii* (*C. argyrites*); original photo by Wyndham Hayward; reproduced courtesy Nat. Hort. Mag.

the case with so many other popular plants today. Only a few varieties have become fixed in the growers stocks under their definite and orginal name, as John Peed, Triomphe de l'Exposition, Candidum, D. M. Cook, Mrs. W. B. Haldeman, Marie Moir, Hortulania, Rio de Janeiro, Poecil Anglais, Thomas Tomlinson, Mrs. Fannie Munson [Plate 18], Sorocaba, Lord Derby, Marie Moir, Rising Sun, Scarlet Pimpernel, Mary Queen of

Scots, and such, which are sufficiently characteristic in their coloring and markings to have made them readily recognizable in the greenhouse and garden even when found under some other name.

Of the species, only *Caladium Humboldtii* [Fig. 27], the darling miniature jewel from Brazil with white spots and blotches on tiny green leaves, is at all available today and it remains a rarity because of the difficulty of propagation and storage over winter. It grows well in a four inch pot.

Caladiums as now grown in Florida are a mass production affair, produced by the thousands for the florists and seed and department store trade. The bulbs are planted in the spring, cut up like potatoes, and harvested in the late Fall, dried off and shipped before cold weather in January and February if possible, as most of the caladium storage sheds are not provided with heat, and frost will seriously injure the tubers.

The tubers grow readily in any soil which is moist, fertile and reasonably well drained, usually raised beds of muck and drained peat bogs are used.

Any good vegetable fertilizer may be used in the beds before planting and the bulbs will need careful weeding and an occasional side dressing of commercial fertilizer when in growth. The root knot nematode is their greatest enemy and the Sclerotia fungi cause trouble in excessively wet soils, especially in the hot part of the summer.

As pot plants or for bedding purposes the bulbs may be started under glass over a brisk bottom heat in flats of mixed peat and sand, and potted up into five or six inch pots when starting to root and sprout. Bulbs may be started from January to July with good results. In the winter care will have to be taken to prevent the started bulbs from decaying if allowed to become chilled or if too much water is given them at first.

A particularly effective demonstration of the use of fancy leaved caladiums as a mass tropical display was included in the Massachusetts Horticultural Society's Spring Flower Show in Boston in March, 1949, when Secretary Arno H. Nehrling directed the forcing of a large number of the tubers especially for the tropical garden which was a feature of the Society's main exhibit. It was years since any important use of fancy leaved caladiums had been made at any major Northern flower show and many favorable comments were reported from the sophisticated showgoers. A decided uptrend in interest in fancy leaved caladiums in the New England area followed the show, florists reported.

Secretary Nehrling of the MHS is, interestingly enough, a son of the late Henry Nehrling of Florida who played such an important part in the development of modern hybrid caladiums.

Caladiums want a warm, moist atmosphere, and can use a potting soil composed of one-third rotted manure and the rest a clean sandy loam or peaty soil for good results. They like an acid soil reaction, the same as callas (*Zantedeschia*). Drainage must be good in the pots or the bulbs may rot. Once in good leaf the plants will require an abundance of

water, and never should be allowed to dry out. Under glass they should be given light shade at all times to prevent burning of the delicate colors in the leaves. In the open they are often grown in the full sun or half shade in Florida and the lower South generally, but require protection from hot, dry conditions, wind, and storms. As bedding plants the tubers can be planted directly in the ground in the South, but are better started inside under glass in pots when wanted for this purpose farther North.

In pot culture, the tubers can be dried off in their pots in the fall, and stored all winter under a bench in the greenhouse or root cellar where they will remain cool but be subject to no moisture or cold. Below 50 degrees F. would be injurious to vitality in all probability. The stronger growing varieties should be selected for growing in the garden in the full sun. The summer of 1949 saw a garden in Houston, Texas decorated luxuriantly with numerous plantings of the famous white variety Candidum, especially for a wedding of note, with outstanding success.

The hybridizing of fancy leaved caladiums is an art in itself, as the female flowers ripen on the spadix before the male anthers shed their pollen in the same flower. As a result, the female flowers do not receive pollen from the same plant. This condition therefore leads to a virtual complete self-sterility, so far as known. The writer, in thousands of plants in bloom, has never observed seed to set on a caladium from self pollination, and as the flower spathe does not open until the pollen is ready to dehisce (and the female flowers are already by that time past the receptive stage) it would be almost impossible for seed to set in nature.

When mature, the female flowers are sticky to the touch, and can be pollinated by hand with a small artist's brush used to remove the pollen from flowers on other plants then at a slightly later stage of flowering. The spathe is best cut away with a small pocket knife to reveal the spadix, before the pollination. Setting of seed may be light or abundant. Many pollination efforts fail completely. The resulting fruit is a one or two-celled berry with several seeds as a rule.

Seed is difficult to set without long practice and careful attention to detail, and if the ripening berries or capsules are not watched carefully, they will "explode" at maturity in all directions from the plant and ants will carry them off in a few hours. Some of the famous hybridizers are reported to have grown 25,000 seedlings a year, although this may have been an enthusiastic horticultural exaggeration. Theodore L. Mead said he did his best hybridizing of caladiums by flashlight at 3 o'clock in the morning and there may be something to this factor of special nocturnal receptiveness.

Most of the resulting seedlings, unless a great many are grown, as the writer can vouch from personal experience, are mediocre and of no horticultural value. In fact, probably no other plant produces so few desirable types among hybrid seedlings. Only one out of thousands will be worth preserving for future study, and less than that for ultimate naming.

The seed may be sown in pots of sterilized soil, sandy loam, with some leaf mold added, and grown a season without a change. Then the tubers should be repotted in the spring and forced into their best growth. The initial season will produce little seedling tubers the size of a pea and slightly larger. Good culture will make them full size in the second year. Then the grower can determine whether he "has something." It is a task of many pains and few rewards as scarcely a hundred or so of the thousands of fancy leaved caladium varieties which have been introduced in the past 80 years remain under their true names in the trade and in collections today.

Caladiums have always been a popular plant in the greenhouses of England and the continent, as well as in America. The firm of John Peed and others were famous for their caladium showings of huge specimen plants in giant pots at the Chelsea show of the Royal Horticultural Society between World War I and II.

In America the first caladium hybridizer was reputedly Adolph Jaenicke, at the Missouri Botanical Garden in St. Louis. He introduced a number of good varieties which are still remembered, as Torchlight, White Flag, Ivory, etc. Few or none of these are still available, so far as known.

Mead's varieties, for which he is best remembered today, although his work with orchids brought him most fame in his lifetime (he died in 1936), include Mrs. Theodore L. Mead (usually known today as Edith Mead), Pliny W. Reasoner, Charles T. Simpson, Osceola, Hildegard Nehrling, Berthold Nehrling, D. M. Cook, Bertha S. Eisele, and Blanche Wise. Several of these are still outstanding varieties in the trade and in collections. Edith Mead and D. M. Cook are standard varieties everywhere.

Nehrling's best variety and masterpiece of caladium glory was undoubtedly Mrs. W. B. Haldeman, a gorgeous pink and rose-centered leaf with white shadings and dots and darker veins against a deep sage green border. It is outstanding in every showing of the caladiums. Among others Nehrling introduced were A. H. Andrews, Dr. George Tyrrell, Mrs. Sophie Nehrling, Mrs. Fannie Munson, Caloosahatchie, Mrs. Ano H. Nehrling, etc. A search of old horticultural records is being made at this time to obtain a complete list of his originations.

The first caladium hybridizer was Louis Van Houtte of France, closely followed by a fellow countryman Alfred Bleu, who displayed their first creations in the new field at a Paris exposition in 1867. Some ten years before, a number of new caladium species had been introduced into Europe through the efforts of two French plant explorers, Petit and Baraquin by name, including *C. Chantinii*, *C. Humboldtii*, *C. Baraquini* and *C. Verschaeffeltii*.

Caladium bicolor, a plain green type with small red and white spots had been known to horticulture since 1789. One of these Van Houtte caladiums shown at the Paris fair in 1867 was named Triomphe de l'Exposition and it remains today one of the sturdy, lovable and trustworthy varieties in the trade everywhere. It is a good red with green border, not

as brillant as Nehrling's later John Peed, but still a fine bedding and pot plant subject.

Caladium Humboldtii is doubtful as a parent of any of the modern hybrids. It is a delightful dwarf species and in the writer's experience of many years has never been known to bloom in cultivation.

Bleu's collection of caladiums grew to more than 250 varieties by the turn of the century. His masterpiece is regarded as Candidum, the showy white variety widely grown today and still unapproached in its class.

The introduction of Triomphe de l'Exposition marked the beginning of the great "Age of Caladiums" which lasted down into the 1920's, when the caladiums went into a horticultural depression for a few years. Nehrling in the 1920's sold his stock of varieties to the Royal Palm Nurseries, at Oneco, Fla., which no longer grows caladiums, and the firm of Reuters in New Orleans, formerly large scale propagators of caladium bulbs, has also withdrawn from major production in the field.

After Van Houtte and Bleu came C. J. Bause, of England, who started hybridizing caladiums in 1875. He was noted for the introduction of yellow types, such as Prince of Wales, Golden Queen, Princess Royal, etc., which seem to have been lost completely in America. The yellow types proved to be more delicate in constitution and are shade-loving.

Bause's son-in-law, Johann Luther, continued the caladium tradition of the firm, and another European breeder who was well known in his time was Jacob Weiss, a German.

The real "Caladium King" of the period, however, was Adolph Lietze, a transplanted German who first went to Brazil as an orchid collector and then took up the hybridizing of fancy leaved caladiums about 1880, with a hundred varieties of Alfred Bleu at his disposal. He had a magic in his hybridizing touch which brought forth an outpouring of distinguished new varieties from year to year up to the time of his death in 1907. Among his finest productions were Hortulania and Rio de Janeiro, which are still favorites in their class today. They have been the parents of many named varieties in the succeeding years.

Lietze produced some 400 named varieties from his Rio de Janeiro gardens in the first ten years. His exhibit at the Chicago World's Fair in 1893 of more than 100 named varieties of fancy leaved caladiums may be said to have started the "caladium fever" in the United States. Nehrling tells in his writings how he was stimulated to take up the growing and hybridizing of caladiums as the result of seeing Lietzes remarkable displays at Chicago.

Old time caladium growers claim that the Lietze varieties, having been originated in open air gardens in Brazil, do better outdoors in the Southern states and similar climates of the world than the greenhouse-grown originations of European breeders. Certainly that is true of many kinds.

Because of his multiplicity of productions and the unusual and odd Brazilian names that Lietze gave many of his varieties, there came a great confusion in the caladium world in his varieties, as growers in the

xCaladium, new white centered Arrow and Lance type, grown by Wyndham Hayward.
Plate 17

United States and Europe soon gave his caladiums new titles, easier to use and remember than such titles as Guaratingueta or Memorio de Vigario Joa Procopio. The confusion has lasted to this day and out of the hundreds and thousands of Lietze's varieties, only a few are available definitely today under their correct names in the trade.

We can still identify Rio de Janeiro, Hortulania; Mrs. John Laing is still available in Europe and India; Aguape, Putomayo, Bahia, Itapoen are still met in collections and catalogues.

Richard Hoffman was the most recent of the great European hybridizers. His English home was at Stretham, near London where he maintained a marvelous collection of the best hybrids in the early 1900's and grew thousands of fancy leaved caladium seedlings from which he selected a few every year for introduction. Hoffman was a wealthy plantation owner in the Far East and spent much of his time there. His greenhouses were under the tender care of a famous gardener, Thomas Tomlinson, after whom he named one of his best caladiums, still extant, a fine rich dark red with green border.

Hoffman merchanized his caladiums through James Veitch & Sons of England and the horticultural firm of C. L. Klissing in Barth, Pomerania. Other caladium firms in Europe included the Chantrier Nursery establishment in France and John Peed in London.

Hoffman was one of the most remarkably gifted of modern hybridizers. His varieties were numerous and spectacular, although only a few survive in common growth, but these include the distinctive Marie Moir, a red speckled Candidum type, for which he received 20 pounds in 1906. Also of his creation are Rising Sun, Admiral Togo, Scarlet Pimpernel, Ace of Hearts, Red Ensign and others which may still be found on dealers lists today.

Candidum, the sterling old-time favorite of Alfred Pleu, certainly rates a pioneer and cherished place in the "Hall of Caladium Fame" along with Van Houtte's Triomphe de l'Exposition. Candidum is a lovely thing, sometimes unfortunately found mixed with Lietze's less desirable Ernst Schmidt, which lacks a fine black striping on the stem which identifies the true Candidum. Candidum and Mrs. W. B. Haldeman are possibly the best all-around caladiums still available in quantity. The writer has been unable to ascertain the exact years of introduction and would appreciate information on this matter.

The most delicate tones and shades of the caladium foliage coloring develop best under lath shade or in a shaded greenhouse. A collection of caladiums in full leaf at their most gorgeous best is not to be surpassed in sheer beauty by any other bulb or tuberous plant. There is such an infinite variety and evolution of forms and colorings, and as every new leaf develops the plant seems more decorative than ever.

Caladiums are dormant in winter under Florida conditions although in warmer climates they may retain some foliage through the entire 12 months. In warm, well-drained gardens the bulbs may be left in the soil all winter, but there is danger of loss from rotting if the weather turns cold and wet at the same time. As soon as the weather drys off the plantings in late fall, the growers dig and store their bulbs.

It takes a mastery and skill which are only to be acquired with the years in order to bring the largest possible number of caladium tubers through the cold months to spring in good condition. If the bulbs are stored in an open shed, as often happens, a sharp frost in the winter may "touch" a large number of the bulbs, starting the dreaded "chalky dry rot," or sometimes a soft decay sets in, to the detriment of the tuber stock. Then the grower must cut out the chalky or soft spots and dust with sulphur or lime to save them.

Some growers dry the bulbs a few days in the sun before storing. This is satisfactory if the bulbs are not exposed long enough to cause sunburn injury, and if they are not allowed to be wet by a sudden rain. Old time growers tell of their panic at seeing rain clouds suddenly develop out of a clear sky when they had 50,000 caladiums drying out in the sun on trays. The trays are usually provided with wire bottoms or lath slats.

A few growers store planting stock not for sale in ground pits of well drained soil. They usually keep well this way unless heavy rains occur in the colder part of the winter which may cause the dormant tubers to rot or suddenly to sprout into growth before their owner is prepared to plant them back. In replanting, the tubers are cut into pieces with eyes, just as one would slice a potato for planting. Even tiny chunks with an "eye" gouged out of the side of a small caladium tuber will make fair sized "bulbs" in a season.

The writer has obtained good propagation of fancy leaved caladiums in the case of new and rare varieties by cutting the tubers up into extremely small parts, planting shallowly in flats of vermiculite, horticultural grade, and growing them in the shade for several months with plenty of water and some complete soluble fertilizer applied in water every few weeks. They will make firm, sound bulblets this way, and a larger increase can be obtained than when the tubes are cut up normally and grown on in the ground, when a percentage of loss always occurs. New varieties as received from hybridizers and horticultural firms in Europe are usually small tubers, half an inch or so in diameter, and it takes several years to work up a stock for commercial sale.

A number of wholesale growers of fancy leaved caladiums are listed among the advertisers in the classified columns of the florists' trade papers in winter. Most of these growers are in Florida, some of them in the Sebring area. A few retail bulb specialists offer named varieties, but by and large the trade is mostly in mixed tubers, as a well-selected assortment of colorful and vigorous types meets the need of almost all amateur fanciers until they come to the stage of collecting named varieties.

Unfortunately as yet for the budding caladium fancier there are only a few growers and dealers who supply stock with any real assurance of conscientious effort at proper identification of their varieties. But this will come. The caladium is on the way up again. As Nehrling once said: "I love them better than flowers," and the writer of these notes is one of many thousands of present-day caladium lovers who agrees with the pioneer Florida plantsman.

xCaladium clone FANNIE MUNSON; grown in granulated peat alone.
Photo by Wyndham Hayward.
Plate 18

The following is a preliminary list of a few Fancy Leaved *Caladiums* varieties originated by Henry Nehrling, from data supplied by his stepson Robert D. Mitchell of Orlando, Fla.—E. O. Orpet, arrow and lance variety, Mrs. W. B. Haldeman, Fannie Munson [Plate 19], Zoe Munson, Fanny Reba, Mrs. Henry Nehrling, Mrs. Arno H. Nehrling, Betty Nehrling, Mrs. F. H. Pooler, Dr. George Tyrrell, Jesse M. Thayer, Stuart H. Anderson, Gertrude Hollick, Peter P. Schutt, Marion A. Meadow, and Richard F. Deckert.

WINTER JASMINE

J. B. S. Norton, *Maryland*

That out door flowers in the winter time are something you go to Florida or California to see is the general thought of northern people. But there are a number of plants that flower outside between Dec. 1 and March 1 in the Middle Atlantic States, where there are often days or sometimes weeks of growing weather in the winter time. The outstanding winter flower, of those we have grown, is the common pansy. A few years ago we had pansies in bloom on the south side of the house every day in the winter; and this year, we have only missed a week when snow covered them.

The next thing to outside flowers is flowering cut twigs inside in winter or early spring. This charming art is practised by many gardeners. One of the best plants for cutting and flowering quickly and easily is the Winter Jasmine (*Jasminum nudiflorum* Lindl.). It is usually overlooked by writers on the forcing of flowers of trees and shrubs, as it is considered too tender for gardens north of Washington. I have had a special regard for this beautiful shrub here in Maryland for nearly fifty years, and have seen it blooming every month in the winter. Usually the flowers are rather scanty, even in spring, as the flower buds develop so easily that freezing weather kills all that are in flower or nearly ready to bloom; then when more dormant buds have advanced enough for another blooming spell a few weeks later, the same thing happens again, so that when spring comes there are not enough flower buds left for a show.

When the winter is continuously cold there is a fine display when all the flower buds open at the same time. *Spiraea Thunbergii* has a similar habit.

This jasmine is thought of as a rather stiff twigged shrub by northern growers, their plants having shorter growth killed back at the ends by the winter cold. Here it is one of the most beautiful bushes in form and color. Though we have had —25°F. twice in fifty years, and 15°–20° below several times, I do not recall any noteworthy winter injury. The profuse, long branches grow up and arch over until the ends touch the ground and soon take root like a raspberry. In a few years we have a great, dense hemispherical mound three to five feet high and six to eight feet across, or further south 8 by 14 feet, and as years go by the

rooted branches extend the colony until there is an ideal cover for a sunny bank or open hillside. The slender branches are dark green and beautiful all the year round.

On a cold day this February I went out to see what the jasmines were doing. There were a few flowers open, though the ground was covered with snow and the midday temperature near freezing. The twigs

Fig. 28. *Jasminum nudiflorum* Lindl., forced into flower in winter.

were covered with buds ready to open, and some that were brought in and put in water in a vase looked like they would unfold tomorrow and give us plenty of color in two or three days. [Figure 28.]

This is the ideal shrub for cutting and flowering inside. There is a profusion of green twigs with pairs of light yellow 4 to 7 parted at the joints which are only an inch or so apart. In late winter when many buds are ready to bloom, they can be brought into flower in a day or two

at room temperature. The individual flowers are up to an inch long and wide and in water last several days, and with the succession of buds in different stages of development for a week or more.

With a large enough planting, pruned for many well developed branches of the desired length for cut flowers, and a cool greenhouse for flowering them, it would be possible to develop a demand for Winter Jasmine bouquets that might be commercially profitable from December to April.

This jasmine is sometimes mistaken for a *Forsythia* but is distinguished by its salver-form corolla from the bell-shaped *Forsythia* flowers.

BARTRAM'S IXIA

WYNDHAM HAYWARD, *Florida*

It is always difficult to speak of horticultural and botanical "finds" with the proper reserve due the more wonderful works of nature. Too often enthusiastic outbursts regarding plant novelties are none too altruistic, and garden lovers of long standing tend to take them with a grain of salt.

The above is a prelude to this formal introduction in popular horticultural literature of a remarkable Iridaceous plant, native of Florida, and found nowhere else in the world outside of a few square miles in the northeastern part of the Peninsular State. The plant is *Salpingostylis coelestina*, or BARTRAM'S IXIA, formerly known botanically as *Nemastylis coelestina* and *Ixia coelestina*.

Strangely enough, although the new generic name *Salpingostylis*, (which I do not admire) was published in July 1931 in the Journal of the New York Botanical Garden, by the late Dr. John K. Small, following the interesting and historic "re-discovery" of the plant after a century and a half of oblivion, the plant is still referred to as *Ixia* by some European botanists of high authority, although there are of course no true native Ixias known in the Americas.

Salpingostylis coelestina is a monotypic genus, closely related to *Nemastylis*, but distinguished by the long, drooping, trumpet-like style, which is the basis for the Latin generic name. It was first observed and recorded in scientific literature by the pioneer American botanist, William Bartram, who published an interesting and authentic account and a remarkably accurate illustration of the plant in 1791, in his "Travels through North and South Carolina, Georgia, East and West Florida."

"Behold the azure fields of cerulean Ixea!" exclaims Bartram in his famous book, recounting the beauties of the North Florida landscape. Despite his account of the plant and his excellent illustration, for a very particular reason the plant was lost to sight botanically for well over a century, until 1931, to be exact. During this long period, various studies of the plant, based on Bartram's records, were made by American botanists, and in view of the failure of anyone to find the plant as reported by Bartram, some botanists even came to the conclusion that it was a

BARTRAM'S IXIA, *Salpingostylis coelestina:* photo by Wyndham Hayward.

Plate 19

myth, or extinct. This perhaps was not too exaggerated, when one considers the fact that to this day no one has ever re-discovered the *Franklinia* tree in nature, since the 18th century, although Bartram found it in South Georgia in 1765. Presumably Bartram's discovery of *Ixia coelestina* was made about the same time, possibly on the same trip.

Real credit for the re-discovery of the plant goes to Prof. E. L. Lord, of Orlando, Florida, who informed Dr. Small of the presence in north Florida of an iridaceous plant similar to or identical with a Louisiana *Nemastylis* species which Dr. Small had showed him in the form of a painting. This occurred at the New York Botanical Garden in June, 1931. Dr. Small expressed doubt as to the existence of such a plant in the area specified by Professor Lord, and a few days later came South with Prof. and Mrs. Lord to check the report.

On the evening of June 9th, 1931, they reached the locality near Starke, Florida, where the supposed *Nemastylis* was known to grow, and the next morning a considerable party of botanically minded plant hunters set out for the field before dawn. It was found that the flowers [Plate 19] were just opening at daybreak, and faded by nine or ten o'clock in the morning.

Thus was the secret of Bartram's "Ixia's" long disappearance solved. Dr. Small at once realized the plant was not a *Nemastylis*, and publication of the new genus *Salpingostylis* followed at once.

Bartram's Ixia has a corm one-half to three-quatrers of an inch in diameter, and responds admirably to cultivation, being easy to grow and bloom in an ordinary flower pot or can in some good, rich, well-drained flatwoods type of soil. This kind of soil is usually rather acid and contains considerable humus and fine sand. The individual flowers are two to three inches across the face, on stems up to a foot in height, or more.

The finding of the plant after so many years caused many a humorous comment on the "rising hours" of botanists, facetious persons remarking that the failure to observe the flowers indicated that earlier morning habits would have been a valuable virtue for plant students.

Bartram's plate of "Ixea caelestina," showing the flower scape, bulb, anther, style and seed pod, is remarkably true except for the very center of the flower. Dr. Small reproduced this plate (No. 3 of the Philadelphia edition of Bartram's "Travels") in his account of *Salpingostylis* in the NYBG Journal.

The wide, spreading, somewhat loose (even "floppy") petals are violet or lavender-violet to purple in color, and the anthers are golden yellow. Small describes the flower as having a white "eye," which I have not seen in any specimens which have come under my observation. Small also adds "rarely white," indicating that pure white forms have been found.

The flowers are easily among the most beautiful of the small "bulb" group in the entire country as well as in the Southeast, and are worth growing for their extraordinary charm and interesting botanical history.

They can be raised to blooming size with good culture in a year from seed. In culture they can be handled like a *Freesia* or *Cypella*, except that they remain dormant all winter and start into growth in the spring. Whether they are hardy in northern gardens is doubtful, but this should be investigated more fully.

The flowers come in pairs on a scape, opening on separate mornings. The seed pods ripen in a few weeks and the seeds are a brick red in color and quite small, slightly smaller than *Freesia* seeds and about the same as *Cypella Herberti* seeds. A few "bulbs" in a pot will provide a long succession of flowers in the spring and summer, some producing more than one bloom scape.

The leaves of *Salpingostylis* are "pleated," as in the cases of *Tigridia* and *Cypella*. The foliage of BARTRAM'S IXIA is not conspicuous, however, and unless the plants were in bloom it is doubtful if they would be noticed in a field of flatwoods grasses. Its natural habitat is usually rather moist land.

Owing to increasing farm cultivation of natural habitats of *Salpingostylis coelestina*, the plant is regarded as becoming very rare, and should have some form of protection before its eradication by the plough and harrow is complete. More widespread cultivation of the plants in suitable areas would save the plant for future generations to admire. It spreads mainly by seed, and according to the best authorities, is found only in the region from Green Cove Springs to Starke, and to Glen St. Mary on the North. This area is to the Southwest of Jacksonville, Florida.

[COOMBS—S. AFR. AMARYLLIDS, CONTINUED FROM PAGE 41.]

CULTIVATION (See also *H. coccineus*, above). These bulbs like a light sandy soil, well-drained and with leaf mold or humus and some well-rotted manure, though they do not need a very rich soil. A little broken charcoal will be good. Blooming time may be changed to some extent by delay in watering, though some bulbs may insist on starting. As the time for house plants is generally the time they may be blooming in Africa, it may be quite possible to use them. I have found them most amenable to pleasing us.

Do not cover bulbs entirely. Crowd in a pot and do not transplant till necessary. Water sparingly till growth begins, then more water till foliage begins to dry, when water should be withheld almost entirely till growth begins again. Long rest is necessary. Burning the tops does have some favorable effect in their native habitat. Weak liquid manure during growing season and when ripening is helpful. They may be grown from seed quite easily but will take several years to reach maturity.

PLANT LIFE LIBRARY

BAILEY'S MANUAL OF CULTIVATED PLANTS, REV. EDITION. 1949[1]

HAMILTON P. TRAUB, *Maryland*

The readers will welcome this revised edition of the Manual of Cultivated Plants "most commonly grown in the continental United States and Canada." The first edition, publ. in 1924, had made a place for itself on the garden library shelf, and this large new edition of 1,116 pages is of first importance to all who are interested in growing plants. The purpose of the work is "to provide a ready means for the identification of the species in the usual domestic flora of the United States and Canada." It includes 194 natural families, 1,523 genera, and 5,347 species. and "many incidental references to species." The study of varieties for obvious reasons is left to the specialists. In addition to the species most commonly cultivated, three classes of species are included (1) plants common in gardens although not listed in commercial catalogs, (2) species of recent introduction that show promise of becoming permanent acquisitions, and (3) species of historic interest.

The book contains explanatory sections on plant names, glossary of terms, authorities, and the vegetable community. There is a key to the families represented in the Manual, and excellent keys under the genera where the number of species is more than a few. The manual is copiously illustrated with excellent drawings.

With reference to the content, the specialist is most apt to feel that plants, clearly coming into the classes of common garden plants not listed in commercial catalogs, and species of recent introduction that show promise of becoming permanent acquisitions, have been omitted. It is easy to see that a general reference book cannot include all such plants. However, the writer lists some of those which he thinks should be included in future editions:

Plants common in cultivation: *Zephyranthes citrina, Zephyranthes rosea, Habranthus brachyandrus, Cyrtanthus sanguineus, Amaryllis advena, Amaryllis aulica, Amaryllis striata* (three or four varieties), *Tulbaghia violacea, Tulbaghia fragrans, Nothoscordum inodorum.*

Plants of recent introduction that show promise of becoming permanent acquisitions: *Zephyranthes macrosiphon, Amaryllis immaculata, Worsleya Rayneri, Lycoris incarnata, Lycoris Sprengeri, Lycoris abliflora, Cooperia Smallii, Cooperia brasiliensis, Eucharis subedentata, Hymenocallis Harrisiana, Hymenocallis amancaes, Phaedranassa Carmioli, Calostemma purpureum, Stenomesson variegatum.*

It should be noted that the *Amaryllidaceae*, sensu Hutchinson (1934) is recognized, except that *Alstroemeria, Bomarea, Hypoxis,* and *Cureu-*

[1]Macmillan Company, New York, $17.50.

ligo are still retained in the family. Also it should be noted that the Family *Agavaceae*, as a separate family, including *Yucca* is recognized, but *Hosta*, n = 30, which has a similar chromosome complement, and similar gross morphology, allowing for its evolution in a mesophytic habitat, is still retained in the *Liliaceae*.

Hemerocallis, n = 11, which apparently belongs with the amaryllids, having a chromosome complement similar to the typical amaryllids and also a similar gross morphology, is retained in the *Liliaceae*.

The listing of these shortcomings according to one reviewer are however not to be taken as a criticism of the work as a whole which is wholeheartedly recommended to all who are interested in the culture of plants. It is a book that should be handy for ready reference at all times.

STANFORD'S A GARDEN OF SOUTH AFRICAN FLOWERS[1]

HAMILTON P. TRAUB, *Maryland*

This is an important book that all gardeners will enjoy reading for it is written in Miss Stanford's usual charming style. It is not a long book but the lack of excess verbiage makes for such economy in the presentation that it includes more than one would at first expect.

In the foreword, L. Bolus points out that "There are delightful accounts of happy plant-hunting expeditions, with glimpses of the flowers in their natural haunts whence many were transplanted to join the company already established on that sunny bird-land slope at Banhoek. Their chief claim for admission has been, of course, that they should have some horticultural value."

In her introduction, Miss Stanford writes that "In the first place, this book was written for my own satisfaction, for the joy of passing on to gardeners the world over the happiness I have had in growing these treasures from the veld and mountain and stream-side. If these rambling notes have the power to stir one South African to grow and develop any of our flowers, the book will have achieved some measure of success. . . . As to plantsmen in Europe, the United States of America, Australia and New Zealand, their cry has always been 'Give us more seeds and more bulbs, and tell us how to grow them.' I hope the book may be useful to them."

The main body of the text is in the nature of a conducted tour of Miss Stanford's garden through the entire year, beginning on a fine spring day (Sunday, 10th of September), and ending on the following August. With such a wealth of native material to choose from it was of course necessary to make a selection but in spite of this the list of plants included is impressive. The reviewer must confess that many were new to him so that he looks forward to the day when he can also have these in his garden.

The book also includes brief sections on the cultivation of bulbous plants, the cultivation of composites, the cultivation of proteas, as well as

[1]K. C. Stanford, A Garden of South African Flowers. Maskew Miller Ltd., Cape Town, South Africa. 63 pages and 14 plates.

an index, and most important, fourteen fine full page plates to delight the reader.

The book cannot be recommended too highly to all keen gardeners who are interested in the best that the world affords for their own gardens.

MOLDENKE'S AMERICAN WILD FLOWERS[1]

HAMILTON P. TRAUB, *Maryland*

This is a very important book that is long overdue. As pointed out by the author, "There seems . . . to be a definite need for a single book, popularly written and copiously illustrated, dealing with the showiest and most interesting plants of the continent—those most likely to attract the traveler. It is in an attempt to fill this gap in botanical literature that the present volume has been undertaken." The field is restricted "as far as practicable, to the herbaceous flowering plants occurring without cultivation in the United States, Canada, . . . St. Pierre, Miquelon, Alaska and Greenland." The plants included were selected in part on the basis of a questionnaire returned from naturalists and botanists residing in this area. The book includes 2,050 species, varieties and named forms, and many others are mentioned incidentally. Not only native plants, but also naturalized exotics that are now a characteristic feature of our wild vegetation, are included. The species are discussed within botanical families. The well-written text, and the many colored plates and gravure illustrations make this one of the outstanding works in the much neglected field of plant popularization.

In addition to the text there is an interesting introduction by the author, an illustrated glossary, a selected bibliography, and an index. The author is to be congratulated on this fine book which will add greatly to the happiness of all interested in American wild flowers.

ANDERSON'S INTROGRESSIVE HYBRIDIZATION[2]

HAMILTON P. TRAUB, *Maryland*

This book is classed as "one of the first books in the Wiley Biological Research Series, which consists of a group of small volumes covering various topics in biology. In this series, contributing authors discuss their

[1]Harold N. Moldenke, American Wild Flowers. D. Van Nostrand Co., New York, Toronto and London. 1949. pp. I—XXV; 1—453. 32 colored illustr., and 32 gravure illustr. $6.95.

[2]Edgar Anderson, INTROGRESSIVE HYBRIDIZATION. John Wiley & Sons, 440 4th Ave., New York 16; Chapman & Hall, Ltd., London. 1949. pp. I—IX; 1—109. $3.00.

[ANDERSON'S INTROGRESSIVE HYBRIDIZATION, CONTINUED ON PAGE 156.]

PLANT LIFE

Volume 6

[Number 3, July]

1950

THE AMERICAN PLANT LIFE SOCIETY

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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Mr. John E. Voight, RFD One, Box 76, Hales Corners, Wisc., in charge of Daylily Trial Garden, at The Botanical Gardens, Whitnall Park.

Mr. W. Quinn Buck, in charge of Daylily Trial Garden, Div. of Ornamental Horticulture, University of California at Los Angeles.

Note: Introducers of new daylily clones should send plants directly to the Trial Gardens for testing. As soon as practical each trial garden will publish, in HERBERTIA, lists of the 10, 25, 50 and 100 best daylilies, on the basis of the clones tested, for the climatic region in which it is located.

DATA CARD FOR HEMEROCALLIS

When describing daylily clones, all breeders and growers are requested to use the Official Data Card for Hemerocallis, devised by the eminent artist and horticulturist, J. Marion Shull, and full described in HERBERTIA, Vol. 7, 1940, and Vol. 14, 1947. These cards should not only be used in describing new clones but also for the description of all older clones grown in the various climatic regions.

For information write to—

Mr. E. Frederick Smith, Membership Secretary,
The American Plant Life Society,
Box 2398, Stanford, Cal.

SCORE CARD FOR HEMEROCALLIS

For the official score card for Hemerocallis see HERBERTIA, Volume 7, page 126, 1940. Reprinted in Vol. 14 (1947), page 37.

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For classification of flower types and score card for Hybrid Amaryllis see PLANT LIFE *6*: 43-46. 1950.

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III. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

BOOKS

1. AMARYLLIDACEAE: TRIBE AMARYLLEAE, by Traub & Moldenke (including the genera *Amaryllis*, *Lycoris*, *Worsleya*, *Lepidopharynx*, *Placea*, *Griffinia*, and *Ungernia;* Manila covers; 194 pages, incl. 18 illustrations. $4.00 postpaid.

This is required reading for every amaryllid enthusiast.

2. DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948, by Norton, Stuntz, and Ballard. A total of 2695 *Hemerocallis* clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (I—X; 1—90), including a portrait of George Yeld. $1.50 postpaid.

PERIODICALS

1. HERBERTIA, vols. 1—15 (Devoted to the *Amaryllidaceae*).
Vols. 1—5 (1934—1938), $17.50 Vols. 6—10 (1939—1943), $17.50
Vols. 11—15 (1944—1948), $18.50 Vols. 1—15 (1934—1948), $52.50

Single copies of vols. 1 to 15, when available, are $3.50 each, except vol. 11, $4.50.

2. PLANT LIFE, vols. 1—6 (Beginning in 1949, vol. 5, PLANT LIFE includes the annual HERBERTIA edition as one of the numbers.)

Vol. 1 (1945), *Narcissus* symposium and *Bromeliaceae* edition, 104 pages, incl. 25 illustrations, $2.50.
Vol. 2 (1946), *Verbenaceae* edition, 100 pages, incl. 9 illustrations, $2.50.
Vol. 3 (1947), Winter and Spring *Gladiolus*, and the History of the Dutch Bulb Industry, 1940—1945; 42 pages, incl. 10 illustrations, $1.50.
Vol. 4 (1948), Arоid Lily (Calla) edition, 48 pages, incl. 11 illustrations, $1.50.
Vol. 5 (1949), *Gesneriaceae* edition, and 1949 HERBERTIA (Australian edition), 134 pages incl. 34 illustrations, $5.00.
Vol. 6 (1950), 1950 HERBERTIA (Hybrid *Amaryllis* edition), and GENERAL PLANT LIFE edition, 162 pages, incl. 47 illustrations, $5.00.
Vol. 7 (1951), 1951 HERBERTIA, and GENERAL PLANT LIFE edition (In preparation, 1950, and scheduled for publication early in 1951.), $5.00.

Vols. 1—5 (1945—1949), $13.00.
Single volumes, 1—7, when available, at the prices quoted above.

Make checks payable to the AMERICAN PLANT LIFE SOCIETY, and send orders to—

Mr. E. Frederick Smith, Membership Secretary,
The American Plant Life Society,
Box 2398, Stanford, Calif.

IV. PLANTS RECEIVING APLS AWARDS IN 1950

The following awards were made during January 1950. Similar awards for the remainder of the year will be reported in 1951 Plant Life.

Amaryllis belladonna var. *Haywardii*: Award of Merit (A. M.), January 12, 1950. Presented to the Society's Trial Garden by Mrs. Mary

G. Henry, Gladwyne, Penna. Illustrated in Plate 8, page 85, 1949 PLANT LIFE. A most satisfactory pot plant.

Amaryllis striata var. *fulgida;* A. M., January 12, 1950. Presented to the Society's Trial Garden by Mr. Wyndham Hayward, Winter Park, Florida. An excellent pot plant.

xCyrtanthus Henryae clone WILLIAM PENN; A. M., January 12, 1950. Presented by Mrs. Mary G. Henry, Gladwyne, Penna. An excellent pot plant.

xCyrtanthus clone METIVIER; A. M., January 12, 1950. Presented by Mrs. Mary G. Henry, Gladwyne, Penna. An excellent pot plant.

[ANDERSON'S INTROGRESSIVE HYBRIDIZATION, CONTINUED FROM PAGE 150.]

particular fields and stress their personal ideas. . . ."

First of all, the publishers are to be congratulated on their keen and refreshing appreciation of the scientist's need to express himself unhampered by professional editors who as a rule are backward looking. And secondly, they are to be congratulated on choosing Dr. Anderson's book as one of this series.

This book contains only 109 pages, but a work of this kind is not to be judged by its length, but rather on its content, which in this case is of high quality, and well worth the price asked. Dr. Anderson brings together important knowledge on the subject of introgressive hybridization. Although he expresses his viewpoint frankly, he is careful to do so with proper reservations as to the importance of introgressive hybridization in the evolution of living organisms.

The book includes a foreword, six text chapters, an epilogue, a selected bibliography, and an index.

Chapter 1 summarizes information on introgression by hybridization in the case of the Louisiana irises; chapter 2, the ecological basis of introgresssion; chapter 3, the genetic basis of introgression; chapter 4, introgression in finite populations; chapter 5, introgression and evolution; chapter 6, special techniques for the study of introgression; and the epilogue, the importance of introgressive hybridization.

It should be noted that Dr. Anderson makes no reference to the difficult problem of criteria for species and generic distinctions, but such works as this and similar contributions will help to lay a sound foundation for the delimitation of such biologic units. Since groups on the species level, and in the case of higher categories, have been proposed in the past by workers with varying educational backgrounds, there is lack of consistency in this field, and this is an important problem which has to be faced by any serious worker in systematics. Dr. Anderson's book is therefore obligatory reading for all interested in systematics, and also for all interested in evolution, genetics, and practical plant breeding.

PLANT LIFE

Volume 6

[Number 4, October]

1950

SEEDS AND PLANTS DIRECTORY

THE AMERICAN PLANT LIFE SOCIETY
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1951

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VOLUME 7

[Nos. 1-4, Jan., Apr., Jul. & Oct.]

1951

EDITED BY

HAMILTON P. TRAUB

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THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

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HERBERTIA

1951

LATIN AMERICAN AMARYLLID
EXPLORATION EDITION

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 82.]

Eustephia armifera Macbr., Publ. Field Mus. Bot. 11: 47. 1931.—Conspicuously very leafy; bulb ovoid, 4 cm. in diameter, attenuate into a neck almost 1.5 dm. long; leaves about 8, oblong-linear, 2—3 dm. long, almost everywhere 12—14 mm. wide, lax or apparently sometimes prostrate; peduncles about 1.5 dm. long, more or less compressed; bracts 2 or 3, rather large, almost 4 cm. long, about 1 cm. wide, subtruncate; flowers about 5, subsessile; perigonium 2.5—3 cm. long, the tube scarcely spotted, quite ampliate at the throat, the segments definitely unequal, ovate, subacute, 6—8 mm. long; free filaments 5 mm. long, narrowly winged, conspicuously dentate on both sides at the apex; anthers about 7 mm. long; style slightly surpassing the stamens but included; stigma irregularly discoid-foliose. Peru.

Hymenocallis repanda Otto & Dietr., Allg. Gartenz. 11: 123. 1843.—Bulb subglobose; leaves subereet, broadly lanceolate-lorate, flat, slender; umbel about 10-flowered; tube green, the segments linear, adnate at the base of the corona, equaling the tube; sinuses of the corona repand. Mexico.

Zephyranthes filifolia Kraenzl.; Herb. ex Baker, Amaryll. 33, nom. nud. 1888.—It differs from *Z. despauperata* Herb. in its smaller stature, all its leaves being capillary (not linear), the peduncle rather thick and quite firm, the pedicel and sheath shorter, and the segments of the perigonium lanceolate to oblong.

Bulb not seen; the lower part of the stem covered with a few brown cataphylls; leaves filiform or more often capillaceous, to 10 cm long, scarcely 0.5 mm. wide; scape without the flower to 8 cm. tall, rather thick, sometimes slightly thickened at the middle (always?), very slightly widened at the apex itself, always 1-flowered (at least in the 12 specimens seen), sheath including the pedicel, ovary, and even the basal part of the perigonium, pellucid, lightly pergamaceous, acuminate, 2.2 cm. long; pedicel about 1 cm. long; flowers yellow, almost like those of our *Gagea pratensis;* tube of the perigonium very short, scarcely 2 mm. long; sepals lanceolate, acute, 1.8—2 cm. long, 3 mm. wide; petals oblong-lanceolate, equally long, acute, 1.8—2 cm. long, 5—6 mm. wide; stamens inserted at the base of the tube, 4 mm. long; ovary 7 mm. long, 4 mm thick; stigmas 3, greatly twisted. Patagonia.

Zephyranthes (*Zephyrites*) *longipes* Baker, differs from the remaining species in this section by its very long pedicel.

Bulb ovoid, 1 inch in diameter, the exterior tunics membranaceous, brown; leaves linear, glabrous; peduncle slender, fragile, almost a foot long; spathe 30 mm. long, cylindric toward the base, bifid toward the apex, the valves convolute; pedicel 3—4 inches long; ovary oblong, oblique, 6 mm. long; perianth pale-red, 3 inches long, the tube short, narrowly funnel-form, the segments of the limb lanceolate; stamens one-third as long as the perianth; anthers linear-oblong; style deeply trifid; capsule globose, 12 mm. long. Uruguay.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 8.]

PREFACE

This LATIN-AMERICAN AMARYLLID EXPLORATION EDITION is appropriately dedicated to Mr. Mulford B. Foster, who received the 1951 HERBERT MEDAL award for his outstanding contributions toward the advancement of the amaryllids.

Mr. Foster contributes to this issue an autobiographical sketch and an interesting article with map about his eight plant exploration trips. In connection with these trips, it is of interest to note that he brought back alive many amaryllids. Part of these have already been described; part are proposed as new species in this issue, and the rest are still to be identified. Some of these amaryllids are of the greatest importance to the plant breeder, particularly such species as the pink *Amaryllis espiritensis* Traub, *sp. nov.*, a smaller statured large-flowered species, described for the first time in this issue; some are excellent pot plants without further breeding; and all are of interest in adding to the sum total of human knowledge.

The cover design by Mr. Foster, shows the ornamental qualities of one of Mr. Foster's discoveries—*Amaryllis fosteri* Traub. *sp. nov.*, described in section II of this issue.

Among the other important contributions appearing in this issue are the following:

The outstanding pink miniature *xAmaryllis henryae* Traub, *hybr. nov.*, is described. It was synthesized by Mrs. Henry by crossing the pink *Amaryllis belladonna* var. *haywardii* and the pink *Amaryllis espiritensis*, already mentioned. The fine *xHabranthus floryi* is named for Dr. Flory; Mrs. Henry proposes the fine new hybrid, *xAmaryllis gladwynensis* M. C. Henry, sp nov. An article is devoted to the technique of producing colchicine-induced polyploid *Hemerocallis*.

Dr. Corliss writes about his garden visits in 1950; Mr. Manley reports on the 1950 Cleveland *Amaryllis* trials; Mrs. Morton writes of the 1950 New Orleans Amaryllis Show, and Mr. Hayward favors us with notes on the 1950 Orlando-Winter Park Hemerocallis Show.

Mr. Hayward writes about *xAmaryllis johnsonii;* Dr. Dyer concludes his fine review of the genus *Brunsvigia*; Miss Ficker reports on somatic chromosome numbers in *Amaryllis species;* Mr. Mitsch comments on the new Narcissus classification; Mr. Manley summarizes the Valleevue *Amaryllis* trials; and Dr. Moldenke makes available some more amaryllid generic and species descriptions in English.

Mrs. Strout and Sir Henry Lynch write about the BLUE AMARYLLIS; Mr. Culpepper writes of outdoor culture of *xCrinum* clone CECIL HOUDYSHEL in Virginia; Dr. Cooley and Mr. Lenington write on daylily culture; Mr. Mitsch and Dr. Cooley report on the 1950 Narcissus season; and Mrs. Henry describes an amaryllid birthday cake.

The 1952 HERBETIA, the 2ND ALSTROEMERIA EDITION (closing date for articles July 1, 1951) will be dedicated to Dr. J. C. Th. Uphof, the noted botanist, who has made valuable contributions toward the advancement of the amaryllids. He will contribute a systematic article on

Alstroemeria to this issue.

The 1953 HERBERTIA, the 2ND NARCISSUS EDITION (closing date for articles July 1, 1952) will feature *Narcissus*.

November 15, 1950

Hamilton P. Traub
Harold N. Moldenke

CORRIGENDA

PLANT LIFE, VOL. 6, 1950

Page 50, 1st line, insert "tentatively" between "has" and "identified."
Page 51, line 11 from top, for "Epple" read "Eppel."
Page 53, line 7 from top, for "fairy-ilke" read "fairy-like."
line 17 from bottom, for "*MacKenni*" read "*MacKeni*."
line 6 from bottom, for "Exemplus" read "Exemplum."
Page 60, line 15 from bottom, for "1950" read "1850."
line 8 from bottom, for "*Hessleriana*" read "*Hassleriana*."
Page 62, line 4 from top, for "Hera" read "Herba."
Page 83, line 18 from top, for "*notalensis*" read "*natalensis*."
Page 90, 4th paragraph, 2nd line, for "Net" read "Not."
5th paragraph, 1st line, after "Doubtful species" insert "[Herb. Amaryll. 266. 1837]"
Page 110, 3rd paragraph, 9th line, for "Hearld Brand" read "Herald Brand."
Page 111, 5th line from bottom, for "litle" read "little."
Page 114, 3rd paragraph, 1st line, for "specie" read "species."
Page 130, 7th line from bottom, for "6" read "5."

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 6.]

Hippeastrum marginatum R. E. Fries, Act. Soc. Upsal., ser. 4, 1 (1): 161. 1905.—*Habranthus*, completely glabrous; leaves many, linear, flat, rounded at the apex, white-margined, the margin dentate; scape elevated, more or less equaling the leaves in length; the two exterior bracts linear-lanceolate, the interior ones numerous, linear; flowers numerous, long-pedunculate, purple, the tube long, narrow; segments of the perigonium oblong, acute. Argentina.

Haylockia andina R. E. Fries, Nov. Act. Soc. Sci. Upsal., ser. 4, 1 (1): 160—161, pl. 9, figs. 1 & 2. 1905.—Bulb round or pyriform, the long neck including the short scape; leaves unknown; spathe hyaline, bifid at the apex; ovary sessile; segments of the perianth oblong, acute, whitish above, rosy beneath; stamens long, situated within the long tube and more than twice as long as it; stigmas very shortly trifid. Argentina.

Dedicated to
Mulford Bateman Foster

Herbert Medalist—Mulford Bateman Foster

Plate 1

MULFORD BATEMAN FOSTER

An autobiographical sketch

On December the 26th, 1888, there appeared in the weekly paper "The Elmer Times," at Elmer, N. J., a two line item in the local happenings column that read like this: "Christmas present arrived at the editor's on the 25th, ahem. Ask him! ???"

This sudden bit of publicity surprised my father as much as it did me. He generally wrote all the copy for that column, but this time one of the men in the composing room got the scoop on him.

It was rather a disappointment to me to have been born on Christmas as that was a very poor time for birthday parties.

It must have been two or three years before it dawned on me that my mother had a green thumb. This gave me a new interest and hope for the future. I soon began to realize that our diningroom was also used for dining, that is, the part that was not filled up with plants.

When I first heard the old saying "A rolling stone gathers no moss," this somewhat cramped my plans for the future because I loved to make miniature gardens with all sorts of mosses and wild plants from the woods just outside of town.

At the age of six I started attending public school. I suppose it was a good idea but it left only Friday afternoons, Saturdays, holidays and vacations for garden making, ditch riding and hunting snakes.

When I finished High School I toyed with that old "moss" saying again, but father thought I should have a business education, so I finished Business College. Then I worked for nearly five years in two of Philadelphia's largest banks. By this time I was afraid that if I did not do a bit of rolling around I would gather too much "moss."

Then I tried being associate editor on my father's newspaper. He wrote as easily and interestingly as the clear running brook that rushed through our little town. It was definitely not easy for me to write. I was the "babbling brook" type.

I still toyed with that rolling stone idea and in 1912 I made my first trip to Florida and the Deep South looking for snakes. I found them, plenty of them. In fact, so many of them that Elbert Hubbard wrote a chapter "Snakes and Sich" in one of his books, "Pig Pen Pete," just about my snakes.

While I was in Florida on that trip I found something else besides snakes, the crackers called it "Spanish Moss." It was festooned in the trees. It fascinated me so much that I took some back north with me (just like a tourist), but it was soon apparent that it preferred to live in the South judging from its behavior in the trial habitat for a few summer months at the Boys' Camp in my new Kittatiny Mountain home in Pennsylvania which I had recently acquired.

That trip to Florida was fatal, as I found sand in my shoes and moss in my hair. In 1923 I made my second trip to Florida, this time to stay as I soon learned that Spanish Moss wasn't moss at all, it was

a bromeliad! That settled the rolling stone idea. So, I've been rolling all over Central and South America for the past eighteen years gathering no moss, but plenty of bromeliads, amaryllids, cacti, orchids, aroids and other tropical plants.

If there has been any spare time I have filled in by doing botanical drawings and painting plant portraits with philosophical interpretations of plant life.

Ever since the first amaryllid I found in the wild in Virginia, *Zephyranthes atamasco*, some forty years ago, they have had a fascination for me, so I've continued to collect the different species of this family to place somewhere in my garden.

On our first cacti collecting trip to Mexico, Racine and I included amaryllids, bromeliads and orchids. On our second trip to Mexico we found the new species *Zephyranthes fosteri* (see HERBERTIA 7: 65-66, 1941). This whetted my appetite. From that time on, even though our trips have been principally for collecting bromeliads, I have continuously collected amaryllids.

Of the more than sixty species of amaryllids representing a dozen different genera that have been collected on our many trips throughout the Americas, the new *Amaryllis Fosteri* Traub, sp. nov. (see page 116 of this issue of PLANT LIFE for type description), which I found in Brazil in 1948, is the most spectacular.

My profession being that of a landscape architect for the past twenty-seven years, my great interest has been a continued effort to find both new and old species of plants that could be used to increase our southern landscape material as well as to add new house plants and cut flowers for use in our homes.

And I am not through yet even though I do not gather moss.

COLLECTING AMARYLLIDS IN LATIN AMERICA

MULFORD B. FOSTER

My eight plant hunting expeditions throughout the Americas have added up to over 50,000 miles. (Plate 2). The first three trips were by automobile into Mexico in 1935-1936 and in 1937. In the first one I was accompanied by an artist friend, and the second two by my wife, Racine, who also accompanied me on all my subsequent collecting trips except the last one.

Cacti was my greatest plant hobby at that time. Bromeliads and orchids came next while amaryllids were incidental. Those three trips in Mexico covered over 15,000 miles, much of it rather hard going especially on the first trip. At that time the highway to Mexico City was not open, so we had to cross the Huasteca Mountains to San Luis Potosi via the OLD SPANISH TRAIL which I'm sure had not been improved

ATLANTIC OCEAN
PACIFIC OCEAN
GULF OF MEXICO
MEXICO
U.S.A.
FLORIDA
ORLANDO
MIAMI
CUBA
PUERTO RICO
TRINIDAD
VENEZUELA
COLOMBIA
COSTA RICA
MEXICO D.F.
BRAZIL
BELÉM
RECIFE
BAHIA
RIO DE JANEIRO
SAO PAULO
PORTE ALEGRE
BOLIVIA
LA PAZ
PERU
LIMA
ECUADOR
QUITO
ARGENTINE
PARAGUAY
CHILE
CANCER
EQUATOR
CAPRICORN
M.B.F.
1946
1948
1939
1940
1938
1935
1936
1937

since the time of Montezuma. In 1935 we were told that ours was the first Florida auto license to enter Mexico City. We covered considerable territory including Mexico City and Acapulco, and then by train to Salina Cruz and Tehuantepec, at the Guatemalan border.

Mexico yielded my first discovery of a new species of bromeliad, *Hechtia melanocarpa*. And one new cactus, *Peniocereus Fosterianus*. Although it was eleven years after collection that these two new species first flowered in my garden and were later described. The only amaryllids I collected were *Zephyranthes macrosiphon* and *Z. grandiflora*, as well as *Cooperia pedunculata*.

The second trip of 1936 had fewer hardships; roads were much better. Collecting was good but we were gone only six weeks; no new species were found that year.

The third Mexican trip of 1937 covered a greater area. On our way to Guadalajara in the northwest, just before reaching Morelos, I collected a nice glaucous leaved phase of *Sprekelia* and discovered the new species later described as *Zephranthes fosteri* Traub [See HERBERTIA 7: 65-66. 1941, for type description.], a beautiful Bengal rose in color. I found a fine *Hymenocallis* too, not yet identified. After this trip, Dr. Hamilton P. Traub and the late Dr. Ausker Hughes, both then of the U. S. AGRICULTURE EXPERIMENT STATION here in Orlando, visited my garden. By their enthusiasm my amaryllid temperature started to rise.

Our trip to Cuba, in 1938, was successful in bromeliads and orchids but somehow we neglected amaryllids although we motored the entire length of that beautiful island. The palms, bromeliads and orchids occupied our attention.

Our first really big expedition was in 1939 to Brazil. This expedition lasted six months. Bromeliads came first and we found more than fifty new species that year. But I began taking amaryllids on this trip. On Mt. Itatiaia, Brazil's second highest mountain, to my surprise, I saw my first epiphytic *Amaryllis;* then again we found these bulbous members growing in trees in the state of Espirito Santo, north of Rio, and also to the south in the state of Santa Catharina. However, to this date I do not have them identified. Unfortunately, they bloom only when I am away from the garden, generally, when I am back in South America! In the state of Parana I discovered the new species, *Cooperia brasiliensis* Traub [see HERBERTIA 12: 38—40. 1945, for the type description.]; this proved to be the first species of this genus to be found in Brazil.

On this same trip I first found the charming *Alstroemeria caryophyllaea* but it was three years later before Mr. Harry Stinson of Seattle, Washington, identified it for me. It was the lovely, long lost fragrant *Alstroemeria*. Ever since, this dainty, winter blooming flower has been a very welcome addition to our garden. Now that I have six successful generations of crosses with this and other Brazilian species, most of them fragrant, I feel that it was one of the most outstanding horticultural finds of all my plant hunting trips.

During the 1939 expedition we collected in the states of São Paulo, Rio de Janeiro, Espirito Santo, Bahia and Parãna, traveling by canoe,

coastwise steamer, horse, oxcart, narrow gauge wood-burning and electric railroads, trucks, private cars, shank's mare and pigaback.

This expedition, in spite of all its hardships had its thrills and was only an invitation to return again in 1940, much against all advice of family and friends. The war clouds in Europe were darkening but this might be the only chance for several years—and it was.

This 1940 expedition was a memorable one. We covered much new territory such as in the states of Minas Geraes and Matto Grosso and retraced some of our 1939 grounds in Espirito Santo, Rio and São Paulo.

I will never forget the late afternoon in July, just at dusk, when I found fruiting capsules of *Amaryllis reticulata* var. *striatifolia*. The brilliant golden-orange inner walls of the wide open capsules contrasted sharply with the shining black globular seeds tied securely in the three sectional cells. As if that was not enough for any amaryllis to display, mother nature included in the bargain on the deep, dark, green leaves a central milk-white stripe as contrast to this splendid fruiting display. I said to myself as I started picking fruit and digging a few bulbs, "the flower will no doubt be an insignificant little affair, but because this 'last act' is so dramatic I'll take a few bulbs anyhow." I rather expected it to be a liliaceous plant rather than an amaryllid. The surprise I received when the first bulb flowered in our Orlando garden, was indeed a thrilling one, and the contrast of those round shining succulent black seeds in an orange setting to the four delicately reticulated pink and white flowers on each stem was far more than I had ever dreamed of. Pandora's Box surely held no greater surprises. There was still one more surprise coming, for I found that every seed which sprouted produced bulbs with those same striking striated leaves.

I found one other colony more than a hundred miles from that first collection, and here, too, all leaves were marked with the milk-white central line. And a few days later, miles from either of those two collections I found still another colony, but one having plain green leaves. Not one of these had a center stripe.

In southern Brazil I found *Habranthus robustus* growing among the plants of *Laelia pupurata alba* down near the sea on great granite boulders. Far out in Matto Grosso I held up a train (but not as a bandit) for several minutes while I dug up another *Habranthus* along the tracks. A few days later, nearer the Bolivian border, I found an *Amaryllis* species with the most perfectly shaped flower I have ever seen. I have its blood in a cross but my one and only surviving bulb is hovering between life and death, as yet unidentified botanically, but I still have hopes of its recovery.

It was on this same expedition that I first saw *Worsleya rayneri*, the striking blue amaryllid, growing in the rich humus filled crevices out on the sunny steep rocks of the Organ Mountains high above Rio. My collected plants did not live long in Florida.

An *Amaryllis* species, determined as new to science by Dr. Traub (see type description of *Amaryllis espiritensis* Traub, *sp. nov.* in section II of this issue); a variety of a recognized species (see description

of *Amaryllis organensis* var. *compressa* (Herb.) Traub, comb. nov. in section II of this issue); and *Amaryllis aulica*, were interesting additions to our collection as well as a few other species as yet unidentified.

Incidentally, I discovered one new piper, *Peperomia fosteri*, and about seventy-five new species of bromeliads in those two memorable years of collecting in Brazil. There still remains much of the material that has not yet been described.

Then came the second World War. For six years I stayed home and, among other occupations, worked with my vast collection, still discovering new species right here in my own garden from plants that bloomed long after I had gathered them in the jungles of South America. This is where I had an advantage over the average botanical collector. I brought the living plants back home, many of them without having first seen their flower or fruit, in fact, not more than ten percent of the amaryllids I collected were in flower when I first found them.

I still have at least twenty-five species of bromeliads and amaryllids, collected in Brazil in 1939-40 that have not yet flowered. A plant lover's explorations never cease nor does his interest ever die.

By the year 1946 the war clouds had blown over, at least that is what we thought then, so it was time for another trip, this one to Colombia, the Gateway to South America. One day in June we enjoyed breakfast in Palm Beach and a late lunch in Barranquilla, Colombia. It was the old magic carpet stuff which had been outdated by fast air travel. One really should spend a lifetime collecting in Brazil and then fold up into chrysalis form ready to emerge the very next day with another life time occupation studying and collecting in Colombia. This should give one an embryonic start to do a bit of plant collecting in some of the other South American countries while enjoying a few additional reincarnations as the same old "plant hound."

The scenery changes much more often and in much greater contrast in Colombia, thanks to the three great cordilleras of the Andes, than it does in Brazil where the mountains are older, but fewer and lower. When anyone asks the question "which country do you like best, Brazil or Colombia," I can only answer "Quien sabe?"

The famous French botanist Eduard André had a head start on me seventy years before. He was greatly interested in bromeliads and his fabulous collecting score was something like this; he collected about one hundred and two species of bromeliads in Colombia and about eighty-four of them were new species! That is an unbeatable record. (See PLANT LIFE 1: 33-39. 1945.) It's lots of fun, though, to follow the "top man." It either discourages you or sharpens your eye sight. We followed much of André's route and found a great majority of his species in addition to about fifty new species as well as many others that he did not collect. I do not know André's record on amaryllids and other families of plants, but I do know that his record in bromels was astonishing.

Here and there, between bromeliads and palms (about 8,000 palm seeds were collected for the Fairchild Tropical Garden in Coconut Grove), I found an *Eucharis* species, determined as new to science by

Dr. Traub (see type description of *Eucharis fosteri* Traub, sp. nov. in section II of this issue); the old species *Phaedranassa lehmannii*, and the low altitude *Bomarea* spp. *B. gloriosa* and *B. moritziana*. It seems that anywhere in the Colombian Andes, as soon as you reach nine to eleven thousand feet above sea level you are almost sure to find some of the showy, vining bomareas. They are lovely and colorful but they prefer the high, cool altitudes; they will rarely spend more than one winter in Florida and never a full length summer. This same dislike for Florida is held by the altromerias of Chile and Peru. So far, not one of them has been happy in my Florida garden. Unlike the Brazilian alstromerias they do not tolerate our summer rainy season. If the Pacific Coast plants ever do get any rain it is generally in the cool of the year.

I had several missions in mind for my 1948 trip and they were in such wide-spread locations that it was necessary to make this trip almost entirely by air. However, no matter what means of travel you use to reach any of the South American countries, when you start collecting plants in the wild, you immediately resort to the primitive ways of traveling.

While Puerto Rico was my first stop, I did little collecting outside of the Caribbean Rain Forest.

My next collecting stop was in Dutch Guiana and although I did not go any great distance into the interior I did find the beautiful *Amaryllis belladonna* var. *barbata*. It was refreshing to see the white counterpart of our common Florida door-yeard "equestre," which is the true *Amaryllis belladonna* L.

Unexpectedly I came upon an interesting area of shell mounds, (acres of fine shells very much like the finely broken coquina shells of the Florida East Coast) where I found an *Amaryllis* species, which Dr. Traub determined as new (see type description of *Amaryllis vanleestenii* Traub sp. nov. in section II of this issue). I found two interesting color phases of this species. In that country I added a few new bromeliad species to my "plant bag" and then I flew on to Brazil, that famous mecca for botanists.

After the northern states of Paraiba and Pernambuco in Brazil I flew on to Bahia. This state of Bahia with her old worn out granite mountains is still good collecting ground. Some interesting amaryllids were to be found there. An *Amaryllis* species, determined as new by Dr. Traub (see type description of *Amaryllis fosteri* Traub, sp. nov. in section II of this issue) is certainly a spectacular sight (Cover Design and Plate 5). With its six orchid shaped flowers topping a three to four foot scape this beautiful amaryllid is really a striking member of the family and I can assure you that it was thrilling to find it even though I wore a fine lot of blisters on my hands in digging these bulbs from tough unwilling soil in a semi-arid area.

Two *Habranthus* species taken in this area may prove of some interest when they flower this coming spring.

On this trip I collected still farther south in Brazil than I had done previously. This time I went on to the state of Santa Catharina

and not far from Blumenau I collected the beautiful little *Amaryllis blumenaria*. This is really a meadow flower as lovely as any species in the family. I brought back both bulbs and seeds and have had them bloom since my return. The seeds are semi-succulent, not as globular as those of *A. reticulata* var. *striatifolia*, but very different from the flat wafer seeds of the usual *Amaryllis* species. Several attempts have been made to grow *A. blumenavia* in this country and apparently with but little success. My experience has been that it desires much water in a loose rather spongy soil and it will thrive best on the shady side.

In Bolivia, not far from La Paz, when I found *Lepidopharynx deflexa*, it reminded me of *Sprekelia*. It is definitely more interesting than beautiful. A few other amaryllids from this high Andean country will have to wait for identification.

In Ecuador, Phaedranassas were numerous and in the high *paramo* regions I found a few very interesting bomareas, but as yet I have not been able to get any identifications. One in particular that I found at an elevation of 13,000 feet, south of Guenca, was a stiff upright plant and the leaves were not resupinate as they are in most of the species of *Bomarea* and *Alstroemeria*.

One *Stenomesson* was the only amaryllid I "bagged" in Peru but I spent very little time there on this trip. That land of the Incas is rich in amaryllids, yet so few of them are happy in Florida.

For several years to come, I hope, I will still look for bromeliads, and doubtless will continue to find a few amaryllids. Who knows? The time may come when I can no longer climb trees, possibly this will give me more time to examine the flora on the ground floor and I might even devote more time in looking for amaryllids, but until that time they will continue to be beautiful incidentals.

I. REGIONAL ACTIVITY AND EXHIBITIONS

EXHIBITION OF AMARYLLIS IN CLEVELAND

THOMAS R. MANLEY, *Horticulturist*
The Garden Center of Greater Cleveland

Amaryllis grown for varietal observation in the Valleevue *Amaryllis* Trials were exhibited to form three displays. Public response to the beauty and charm of this flower was beyond all expectations. Cleveland is *Amaryllis* conscious as a result of these displays and local sources selling the named Dutch Hybrids are swamped with requests to obtain certain varieties depending on the taste of the purchaser.

In planning the test garden Mr. Arnold M. Davis, Director of the Garden Center of Greater Cleveland, stated that "Once Clevelanders became aware of the beauty of these new giant flowered Dutch Hybrids, *Amaryllis* would be found in most flower loving homes." The displays plus the excellent educational program set up by Mr. Davis has acquainted the public with the culture of amaryllis. Newspaper articles, radio talks, and television demonstrations of potting and caring for amaryllis reached thousands. Garden Center staff members gave illustrated lectures to many garden clubs. Result, several garden clubs held *Amaryllis* shows while others held flower arrangement shows using amaryllis to perfection.

CLEVELAND HOME AND GARDEN SHOW

This show was visited by over 286,000. The *Amaryllis* were exhibited in a 1000 sq. ft. rectangular display (see Plate 3), featuring over 200 8" pots of named varieties of Dutch Hybrids and Species, *A. belladonna* L., *xA. johnsonii*, and *A striata*. Background material consisted of *Ilex opaca, Ilex crenata microphylla, Cahamaedaphne calyculata* and *Taxus cuspidata nana*. Bordering the planting were *Primula malacoides* and *Hedera helix baltica*, accenting plants consisting of *Clivia minata* and *Veltheimia viridiflora*. The display was divided into four sections each featuring varieties of the leading Dutch hybridizers: Ludwig, Warmenhoven, DeGraaff and one of Species and American Mead Hybrids. This display was by public opinion the feature display of the Show.

Not only did the *Amaryllis* increase in number of bloom open per scape during the show but those open at the beginning of the show remained open during the entire eight days. The photograph of the exhibits (Plate 3) was taken on the opening day of the show.

Amaryllis exhibits at the Cleveland Home and Garden Show, 1950.

Plate 3

CLEVELAND MUSEUM OF ART DISPLAY

One of the weekly feature displays in the court of the Cleveland Museum of Art was devoted to *Amaryllis*. Many plants were displayed among leafy ferns and oriental pottery and handicraft of the 12th century. Not only did the *Amaryllis* enhance these priceless museum pieces but gave a bizarre touch which met with public approval. Thousands viewed the displays each week, many paused to comment on the *Amaryllis* believing them to be a plant of yesterday, not the ultra modern flower of today. This display will be enlarged and repeated in 1950.

EASTER DISPLAY AT THE GARDEN CENTER OF GREATER CLEVELAND

Amid live rabbits and ducklings, the *Amaryllis* formed the background of the Garden Center Easter display. Attendances of 10,000 or more per day are common at Easter time and displays are superb in the Garden Center. Mrs. A. F. Burkett, Flower Arranger, and Miss Viola Briner, Educational Consultant of the Garden Center, planned and arranged many of the pots of *Amaryllis* in the Easter garden. Many arrangements by Mrs. Burkett featuring *Amaryllis* were on the tables and stands in the Garden Center. As a cut flower it holds well, and buds out of water remained fresh for days. Like the other displays, *Amaryllis* will be used next Easter and a number will be forced for Christmas.

HIGHLIGHTS OF 1950 GARDEN VISITS

PHILIP G. CORLISS, M. D., *Southwest Regional Vice-President, A. P. L. S., Somerton, Arizona*

During the past season my visits to growers of the amaryllids was chiefly limited to the southwest region, of which I am vice-president. My annual swing around the country was again pointed at growers of daylilies, so I feel that this report naturally falls into two parts:

AMARYLLIS IN THE SOUTHWEST

There seems to be a great increase in the interest of gardeners in the southwest in the *Amaryllis* family. This is naturally reflected in greater activity on the part of those commercial growers who list these bulbs and who hybridize them.

The spectacular *Sprekelia* always causes a sensation, whether blooming in the garden or when displayed at flower shows. It was effectively used in an arrangement with tall bearded iris at the 1950 Southern Iris Show. It does well in full sun on the Arizona desert and blooms better than when protected by some shade. In this respect it is like all others of its family which I have been growing in the southwest.

One of the most pleasant stops on my trips this year was at the Santa

Barbara garden of Mr. and Mrs. E. O. Orpet. They had a wealth of interesting material to show me, even though they were quite tired from spending the hot afternoon with an enthusiastic young customer.

At the fields of Mr. Hermon Brown, hybridizer of *Amaryllis* in Gilroy, California, I saw the last blooms of some of his interesting flowers.

In the warm valley behind the coastal mountains of the San Francisco Bay area, Mr. Frank Leach has extensive plantings of most of the principal varieties of *Alstroemeria*. I enjoyed a visit with him in the distinguished company of Professor Sidney Mitchell and his charming wife. The alstroemerias were at peak bloom.

I wonder how many of our members are familiar with the fabulous collection of flora to be found in the Arboretum of San Francisco's Golden Gate Park? I had a wonderful visit with Mr. Eric Walther, superintendent of the gardens, and spent several days studying and photographing the flowers which have been brought here from all parts of the world, and are planted in sections according to the continent of their origination.

Like that of San Francisco, the new "Arboretum" of Los Angeles County is really going to be a Botanical Garden. Mr. Quinn Buck is now on its staff, and I have had several pleasant contacts with him.

Dr. A. B. Stout lectured on *Hemerocallis* to the Southern California Institute of Horticulture early in September, and at that meeting I not only won a wonderful Rex Begonia on a raffle, but met many of our members who were in attendance.

DAYLILIES ACROSS THE COUNTRY

In the final tour to gather information for my forthcoming book on daylilies, I drove another seventeen thousand miles around the nation, visiting as many important daylily growers and gardens as possible. The annual meeting of The Hemerocallis Society in Cleveland was well attended by prominent daylily enthusiasts, and I was honored by being asked to show some of my Kodachromes at the annual banquet, sharing the program with Dr. Samuel Emsweller, the principal speaker of the meeting.

The following weekend I attended the luncheons and garden tours of the New England Regional meeting, where the Nesmith, Fraim, Knowlton, Howe, Merry, and Plouf gardens were visited. On the way to these meetings I saw the daylily bloom at Sarcoxie, Missouri (Gilbert Wild & Son), LaFontaine, Kansas (Hill-son), Bartlesville, Oklahoma (Rice and McKeithan gardens), Kansas City (Lenington garden), St. Louis, Mo. (Dill and Rudy gardens), and Columbus, Ohio (Stephan garden). On the return trip, I visited the David Hall, Elmer Claar, and Hubert Fischer gardens in Illinois, the Joseph Wood gardens in Yakima, Washington, and the California gardens of Professor Mitchell, Harold Johnson, and Carl Milliken.

The finest public planting of daylilies I have seen is in the Missouri Botanical Garden at St. Louis, where large clumps of the Stout daylilies are magnificently displayed with other perennials. The three runners-

up, in my opinion and experience, are at Swan Lake, South Carolina; Whitnall Park, near Milwaukee; and at the Waltham (Massachusetts) State Experimental Station.

As a result of my travels, I have concluded that form, size, and color have too often been emphasized by our hybridizers to the exclusion of recurrent bloom, ability to remain open in the evening, and to resist fading and wilting. Four varieties are available which are almost continuous bloomers in mild climates. These should be used as parents; and as they are different from one another, should produce many varieties of repeat bloomers. They are: Amur Valley (yellow); Constance (bicolor); Blanche Hooker (red); Oneita (rose).

I think the appearance of daylilies in the late afternoon is very important—can they hold their beauty through the day? If I cannot spend an entire day in a garden, I try to arrive at five in the afternoon, and return at ten o'clock in the evening, with flashlight, if necessary, to see whether they have closed or remained open. Regional performance varies greatly, and cannot be over-emphasized in evaluating daylilies.

EDITORIAL NOTE.—Daylily seeds offered. Our vice-president for the Southwest Region, Dr. Philip G. Corliss of Somerton, Arizona, has offered to give twenty seeds from crosses of the best new daylily hybrids for all NEW memberships which are sent to him. If you know someone who might be interested, tell Dr. Corliss what daylily characteristics are wanted in the parentage.

ORLANDO-WINTER PARK HEMEROCALLIS SHOW, 1950

WYNDHAM HAYWARD, *Florida*

The Mead Botanical Garden at Orlando-Winter Park, Fla., held its annual Hemerocalilis Show on Sunday, May 21, 1950, with good attendance of daylily enthusiasts from all parts of the state.

Among the daylily breeders showing their creations at the Mead Gardens guest house were Ralph W. Wheeler of Winter Park, Mrs. Bright Taylor of Ocala, Wyndham Hayward, Winter Park, Mrs. Gerald Knight, Orlando, and a large selection of fine hybrids, many of them of Russell origin, were exhibited by Soper's Gardens, Orlando. Frank Vasku, Winter Park, showed unnamed seedling selections. The show is held on a non-competitive display basis.

Wheeler showed his own hybrids exclusively, with a number of named varieties, principally in the dark red and maroon tones, including one which attracted much attention, nearly midnight black in shade, named "Raven."

A newly introduced variety named PAULA WAGNER, with pleasingly compact flower and recurved petals, golden yellow in color, was shown by Wyndham Hayward as his latest novelty. It is named after the wife of the new president of Rollins College, Winter Park.

Wheeler showed 28 of his varieties, including BRACKEL, SCARLET

1950 Amaryllis Queen of New Orleans

Plate 4 (See bottom of opposite page for additional legend.)

Sunset, Royal Lady, Paul Ihrig, Bacchus, Ming Toy, Demi-Tasse, Vega, Berceuse, Bobolink, Amherst, Lady Franklin, Mirage, Show Girl, Psyche, Naranja, Tarrytown, Sabrina, Brandywine, Ballet Girl, Billie Burke, Martha Washington, Victoria and Ganymede. The Knight group showed one of their named varieties, Lena Tyson.

In the Hayward collection were his own Emperor Jones, Babette, Ramona, Tahiti Belle, Old Rose, Cleo, Minnie, Araby, Delia, Clarence, Antoinette, Orlando, Florida, Irene, Zulu Boy, Salmon Rose and E. W. Yandre. Besides these he displayed choice flowers of several other prominent hybridizers, including Dr. A. B. Stout, Mrs. Thomas Nesmith, etc.

Mrs. Taylor's group, picked in Ocala, 80 miles away before the dawn and brought by motor to Winter Park in the early morning, included numerous examples of her interesting and showy new seedlings and some of her named varieties, as Penelope, H. Harold Hume, Man O'War, Sally O'Neal, Shalimar, Florida Gold, Pink Bowknot, Spice, Sunset Glow, San Francisco, Rubaiyat, Prima Donna, etc.

One of the most remarkable flowers in the show was the giant lemon yellow Midwest Star, of the Sass strain from Nebraska, in the Hayward collection.

NEW ORLEANS AMARYLLIS SHOW, 1950

Mrs. W. D. Morton, Jr., *Pres. Garden Circle, New Orleans, La.*

The second Official Amaryllis Show, sponsored by the Garden Circle, was held on March 11th-12th, 1950. The lower floor of the Jewish Community Center, 5342 St. Charles Ave., was a mass of loveliness. Beautiful arrangements made by the Garden Clubs, and lovely specimens exhibited by individuals filled the rooms and spacious halls. Ribbons, Sweepstakes and APLS awards were given, and six accredited Judges had charge of the awards.

Miss Marilyn Favret, daughter of Mr. and Mrs. B. A. Favret, Jr., was crowned the 1950 Amaryllis Queen by Safety Commissioner Bernard J. McCloskey (Plate 4). Miss Rosemary Wingrave last year's Queen presented Miss Favret and her Court of maids. Miss Favret's Court included Miss Greta Le Blanc, Miss Joyce Gilthrope, Miss Annette Ruckstuhl, Miss Clementine Doskey, last year's Queen—Miss Rosemary Wingrave, Miss Betty Jane Keating, Miss Joan Harrison, Miss Elsie Blanchard and Miss Sue Maynard.

Plate 4. (See opposite page.) The queen of the New Orleans Amaryllis Show, 1950, Miss Marilyn Favret, center, is crowned by Safety Commissioner Bernard J. McCloskey at ceremonies at the Jewish Community Center. Others, from left, are (left side) Miss Greta Le Blanc, Miss Joyce Gilthrope, Miss Annette Ruckstuhl, Miss Clementine Doskey, last year's Queen—Miss Rosemary Wingrave; (right side) Miss Betty Jane Keating, Miss Joan Harrison, Miss Elsie Blanchard and Miss Sue Maynard.

Amaryllis fosteri Traub, *sp. nov.*

Plate 5

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

NEW SOUTH AMERICAN AMARYLLIDS

HAMILTON P. TRAUB, *Maryland*

We are indebted to Mr. Mulford B. Foster, Mr. M. A. Carriker, Jr. (through Dr. Rodolphe M. de Schauensee), Dr. H. F. Winters, Dr. Harold N. Moldenke, and Dr. Ramón Ferreyra, for the amaryllids here described. Among these are included some very fine *Amaryllis* species for the breeder, and the first *Zephyranthes* species from Puerto Rico.

Amaryllis fosteri Traub, **sp. nov.**—Planta bulbosa; bulbo parvo; foliis 2-6, aestate post anthesim prolatis 31—37 cm. longis, longe oblanceolatis 2.2—3 cm. latis obtusis; scapo verno prolato, sub anthesis 50 cm. alto, sub fructu non elongato; spatha bivalvata, valvis lanceolatis 4.7 cm. longis; umbella 5-flora; pedicellis 3.2 cm. longis; ovario 1.1 cm. longo; segmentis tepalorum perigonii valde recurvatis; tubo tepalorum 1.5 cm. longo; paraperigonio fauces operto; segmentis tepalorum 8—8.5 cm. longis 1—1.6 cm. latis, angustis lineari-lanceolatis obtusis, rubellis, intus linea lactea ornatis; staminibus styloque fasciculatis valde exsertis; stigmate obscure 3-lobato.

DESCRIPTION.—Bulb small; leaves 2—6, produced after the flowers in summer, 31—37 cm. long, long-oblanceolate, 2.2—3 cm. wide, obtuse; scape produced in spring, 50 cm. tall at anthesis, not elongating in fruit; spathe 2-valved, valves lanceolate, 4.7 cm. long; umbel 5-flowered; pedicels 3.2 cm. long; ovary 1.1 cm. long; perigone with tepalsegs much recurved; tepaltube 1.5 cm. long; paraperigone closing in the throat; tepalsegs 8—8.5 cm. long, 1—1.6 cm. wide, narrow linear-lanceolate, blunt, shell pink (RHS, 516/1) with 5 mm. wide cream band in center; stamens and style fasciculate, very much exserted; stigma obscurely 3-lobed. Type: Traub nos. 101, 149 and 153, in the Traub Herbarium; type illustrations Plate 5; and Plant Life 6: Figs. 7 and 8. 1950.

RANGE.—Brasil; Bahia, near Amargosa, 305 m. (M. B. Foster, 1948), "in the caatinga along with the bromeliads and cacti in a wild, harsa section with acid soil."

NOTES.—On the basis of kodachromes furnished by Mr. Foster, this species was tentatively identified (PLANT LIFE 6:49-50. 1950) as *Amaryllis muesseriana* (L. Lind. et J. de Barr.) Traub & Uphof, in Herbertia 5: 129. 1938, *anglice;* (syn.—*Hippeastrum muesserianum* L. Lind. et J. de Barr., L'Illus. Hort. 43: 376, pl. LXXII. 1896, *nomen subnudum*), in the hope that this name could thus be validated. However, when L'Illus. Hort. illustration was compared with the living plant in flower, it was not possible to maintain the tentative identification due to the extreme difference in the width of the tepalsegs which are only 1—1.6 cm. wide in *Amaryllis fosteri.*

Amaryllis espiritensis Traub, *sp. nov.*

Plate 6

This very fine species has been appropriately named for Mr. Mulford B. Foster, the 1951 Herbert Medalist, who brought it back alive so that we may all enjoy it.

Fig. 1. *Amaryllis espiritensis* Traub, *sp. nov.*

Amaryllis espiritensis Traub, **sp. nov.**—Planta bulbosa; bulbo parvo; foliis usque ad 6 obovatis 15—22 cm. longis, 3—4.7 cm. latis, aestate productis; scapo hieme producto 30 cm. alto; spatha bivalvata, valvis lanceolatis usque ad 4 cm. longis; pedicellis 2.5 cm. longis; ovario 5 mm. longo; perigonio roseo, gula subviridi-albida; tubo tepalorum 3 cm.

longo; paraperigonio in gula fimbriis composito; segmentis tepalorum 7 cm. longis, 2.5—3.1 cm. latis lanceolatis; staminibus styloque faeciculatis declinato-adscendentibus; stigmate obscurissime 3-lobato.

DESCRIPTION.—Bulb small; leaves up to 6, obovate, 15—22 cm. long,

Fig. 2. *Amaryllis vanleestenii* Traub, *sp. nov.*

3—4.7 cm. wide, produced in summer; scape produced in winter, 30 cm. tall; spathe 2-valved, valves lanceolate, up to 4 cm. long; pedicels 2.5 cm. long, ovary 5 mm. long; perigone Porcelain Rose, (RHS Color Chart 620), greenish-whitish throat; tepaltube 3 cm. long; paraperigone of fimbriae at the throat; tepalsegs 7 cm. long, 2.5—3.1 cm. wide, lanceolate;

stamens and style fasciculate, declinate-ascending; stigma very obscurely 3-lobed. Type: Traub nos. 31 and 126, in the Traub Herbarium; type illustrations, Plate 6 and Fig. 1.

RANGE.—Brasil; Espirito Santo, near Santa Thereza, alt. 900 m., partial shade; Foster, Aug. 7, 1940.

NOTES.—This species was collected by Mr. Mulford B. Foster in 1940. It should be noted that this species is one of the parents of the outstanding hybrid, *x.Amaryllis henryae* Traub, sp. nov., produced by Mrs. Mary G. Henry, which is described in the following section (see Fig. 22).

Amaryllis vanleestenii Traub, **sp. nov.**—Planta bulbosa; bulbo parvo 4 cm. diametro; foliis late obovatis 19—21 cm. longis, 4—4.8 cm. latis, ad apicem rotundatis, deorsum versus angustatis, post anthesim aestate productis; scapo 36 cm. alto, extremo hiemis vel initio veris producto; umbella biflora; spatha vivalvata, valvis anguste lanceolatis usque ad 5 cm. longis; pedicellis 2.5—3.5 cm. longis; ovario 1.2 cm. longo; tubo tepalorum 2.2 cm. longo; segmentis tepalorum lanceolato-acutis vel acuminatis 9 cm. longis, 2.9—3.4 cm. latis; paraperiginio in gula fimbriis composito; staminibus styloque segmentis tepalorum brevioribus; stigmate obscurissime 3-lobato, lobis globosis minus quam 1 mm. longis.

DESCRIPTION.—Bulb small, 4 cm. in diam.; leaves 2, broadly obovate, 19—21 cm. long, 4—4.8 cm. broad, rounded at apex, narrowed below; produced after the flowers in summer; scape 36 cm. tall, produced in late winter or early spring; umbel 2-flowered; spathe 2-valved, valves narrow-lanceolate, up to 5 cm. long; pedicels 2.5—3.5 cm. long; ovary 1.2 cm. long; perigone scarlet (RHS Color Chart 19/1), whitish-yellow throat, tepaltube 2.2 cm. long; tepalsegs lanceolate-acute or pointed, 9 cm. long, 2.9—3.4 cm. wide; paraperigone of fimbriae at the throat; stamens and style shorter than the tepalsegs; stigma very obscurely 3-lobed, lobes less than 1 mm. long, globose. Type: Traub no. 165, in Traub Herbarium; type illustration, Fig. 2.

RANGE.—Surinam; near Paramaribo; in shell mounds, in full sun; alt. about 25 ft.; Foster, Oct. 3, 1948.

NOTES.—Collected by Mr. Mulford B. Foster in Surinam in 1946. At the suggestion of Mr. Foster this species has been named for Mr. H. N. Van Leesten, of Paramaribo, who assisted Mr. Foster considerably in all of his collecting in Surinam.

Amaryllis viridorchida Traub, **sp. nov.**—Planta bulbosa; bulbo globoso 8 cm. diametro 6 cm. alto; collo 4—4.5 cm. diametro 6 cm. longo; radicibus crassis 6.5 mm. diametro; foliis usque ad 9 sempervivis oblanceolatis 41—51 cm. longis, supra medium 3.5—4.5 cm. latis, attenuato-acutis; pedunculo usque ad 30 cm. alto; spatha bivalvata, valvis 8.5 cm. longis; umbella biflora; pedicellis 3.5—4 cm. longis; ovario 1.7—2 cm. longo subtriangulari; tubo tepalorum 1.9 cm. longo; paraperigonio fauces operto; segmentis tepalorum secus costam profunde viridibus, adversus margines diluto-viridibus, oblanceolatis 6—7.5 cm. longis, 1.6-2.4 cm. latis; staminibus declinato-adscendentibus, eorum longissimis paullo exsertis; stylo exserto; stigmate trifido, lobis ca. 2 mm. longis.

DESCRIPTION. — GREEN ORCHID-FLOWERING AMARYLLIS Bulb globose, 8 cm. in diam., 6 cm. long, tapering into a neck, 4 x 4 cm. in diam., 6 cm. long; roots thick, up to 6.5 mm. in diam., some growing on the surface of the ground; leaves up to 9, evergreen, oblanceolate 41—51 cm. long, 1.8 cm. wide at the base, 3.5—4.5 cm. wide above the middle, tapering to an acute point; peduncle dull green, slightly tinged reddish at the base, hollow, somewhat flattened, edges rounded, up to 30 cm. tall, 1.4 x 2.1 cm. at the base, tapering to 0.7—1.2 cm. at the

Fig. 3. Amaryllis viridorchida Traub, *sp. nov.*

apex; spathe 2-valved, valves green, 1.9—2 cm. wide at the base, 8.5 cm. long, apexes acute, edges infolded after anthesis; umbel 2-flowered; pedicels green, 3.5—4 cm. long; ovary green, 1.7—2 cm. long, triangular with rounded edges; ovules many per locule; perigone green in general aspect, any other coloration is barely perceptible except on very close inspection; tepaltube green, 1.9 cm. long, 9 mm. in diam. at the base, 1.4 cm. at the apex, triangular with rounded edges; tepalsegs of four different lengths, darker green in mid-rib region, becoming lighter green

toward the edges; sepsegs oblanceolate, 7—7.5 cm. long, 1.6—1.8 cm. wide where widest, connivent, cuspidate at apex, very slightly light brownish on the outer upper part of keel; petsegs oblanceolate, 6—7 cm. long, 1.6—2.4 cm. wide where widest, entirely green, recurved; paraperigone (corona) closing in the throat, whitish-green, 3—4 mm. long, membranous, margins undulate; stamens, 2 in one, 4 in the other flower, aborted; the longest of the 2 or 4 fertile ones exserted about 1 cm., of four sets of lengths, declinate-ascending; anthers about 2 cm. long, 3 mm. wide, before pollen is shed, whitish with deep bluish line on narrow edges of anther; pollen yellowish-greenish; style exserted; stigma trifid, very light pinkish; capsule and seeds unknown. Type: Traub nos. 182 and 183, in the Traub Herbarium; type illustration, Fig. 3.

Fig. 4. *Amaryllis oconequensis* Traub, *sp. nov.*

RANGE.—Brasil; State of Rio de Janeiro, slopes of Serra dos Orgaos.

NOTES.—Collected by Dr. Harold N. Moldenke, (no. 19611) Sept. 17, 1948, on the slopes of Serra dos Orgaos, State of Rio de Janeiro.

The flowers open very slowly, and last for several days. They seem to mimic a green orchid, with sepsegs connivent and petsegs recurved [see Fig. 3]. This species should be a very valuable addition to the *Amaryllis* breeding collection.

Amaryllis oconequensis Traub, **sp. nov.**—Planta bulbosa; bulbo globoso-subuplano, collo brevi; foliis sempervivis usque ad 8, usque ad 20 cm. longis, 5.3—5.6 cm. latis, oblanceolatis acutis; scapo sub anthesi 9 cm. alto, sub fructu usque ad 24 cm. elongato; umbella 4-flora; spatha

Amaryllis organensis var. *compressa* (Herb.) Traub, *comb. nov.*
Plate 7

bivalvata, valvis 5 cm. longis; pedicellis 1.2—6.5 cm. longis; ovario 1.7 cm. longo; tubo tepalorum viridi subtriangulari 2 cm. longo; paraperigonio viridi 2 mm. longo, setis filiformibus fauces opertis; segmentis tepalorum oblanceolato-acutis 11—12.5 cm. longis, 2.5—5 cm. latis, intus rubris, parte inferiore rubello-brunnea, parte superiore extus rubra, faucibus astro flavido-subviridi notatis; staminibus styloque exsertis fasciculatis declinato-adscendentibus; stigmate subtriangulari, lobis globosis.

Description.—Plant evergreen, bulb globose-flattish, with a short neck, the globose part 7.7 x 8.7 cm. in diam., neck 4.3 cm. long, 3.9 x 4.4 cm. in diam.; leaves sheathing below, up to 8, up to 20 cm. long, 2.4—2.8 cm. wide at the base, 5.3—5.6 cm. wide at widest area above middle, oblanceolate, acute, but final point is rounded; scape 9 cm. tall, flattish with rounded edges, 1.5 x 2.4 cm. at the base, 1 x 1.7 cm. at the apex, elongating to 24 cm. in fruit; umbel 4-flowered; spathe 2-valved, whitish, valves about 2.2 cm. wide at the base, 5 cm. long, acuminate pointed; bracteoles 4, whitish, similar to spathe-valves but much smaller; pedicels variable in length, 1.2—6.5 cm. long; ovary 6-ribbed, 1.7 cm. long, 1.2 cm. in diam.; perigone bilaterally symmetrical, about 10.5 cm. long with tepalseg tips horizontal or slightly reflexed, 10.6 cm. across face, light yellowish-green star in throat, near Sap Green (RHS Chart 62/1), the upper portion Delft Rose (RHS o20/1), tepaltube green, 2 cm. long, 8 mm. at base, 1.1 cm. at apex, triangularish; paraperigone green, 2 mm. long, with filiform bristles, closing in the throat; tepalsegs oblanceolate-acute, 11—12.5 cm. long, 2.5—5 cm. wide, red on inside; lower portion reddish-brownish, upper portion red on outside; yellowish-greenish star in the throat; stamens and style exserted, fasciculate, declinate-ascending; style exserted; stigma triangularish, lobes globose. Type: Traub nos. 184 to 188, incl., in the Traub Herbarium; type illustration: Fig. 4.

Range.—Southeastern Peru; Oconeque, Prov. Puno, Eastern Cordillera.

Notes.—Collected by Mr. M. A. Carriker, Jr., between May 22—June 5, 1931, at Oconeque, Puno, Peru. According to Dr. R. M. de Schauensee, "Oconeque is a village situated at an altitude of 8,000 ft., on the Eastern Cordillera. The plant could have been collected either above or below this altitude for Oconeque is situated in a deep valley." The plant was sent by the collector to Dr. de Schauensee, Vice-Pres., The Academy of Natural Sciences, Phila., who sent it to the writer for identification.

Amaryllis organensis var. **compressa** (Herb.) Traub, **comb. nov.**, syn.—*Hippeastrum organense* var. *compressum* Herb., Bot. Reg. Lond. 28: misc. 39. 1842. According to Herbert (1842) this appears among Gardner's specimens of *Amaryllis psittacina* to which it approximates in color but *A. psittacina* has a strong screen (corona) and the upper tepalseg is depressed.

Mr. Mulford B. Foster again collected this plant in the Organ Mountains, Brasil, in 1940. It flowered for Mrs. Mary G. Henry in early January, 1950, under greenhouse culture, who contributed the illustration (Plate 7).

Eucharis fosteri Traub, **sp. nov.**—Planta bulbosa; bulbo parvo, viis vegetabilibus rapide augmento; foliis usque ad 5; petiolo 7—10 cm. longo; lamina late elliptica 13 cm. longa, 6—6.5 cm. lata; scapo usque ad 29 cm. alto; umbella 8-flora; pedicellis 1.5—3 cm. longis; ovario 4 mm. longo; tubo tepalorum 1.8 cm. longo, dimidio inferiore viridi, dimidio superiore albo; segmentis tepalorum albis lanceolatis usque ad oblongis 1.6 cm. longis, 6—8 mm. latis; staminibus albis, quam segementis tepalorum dimidio brevioribus, ad basim vix vel non connatis; antheris versatilibus subalbidis; stylo albo, limbum perianthii expansum circiter aequanti; stigmate albo trifido, lobis globosis 1 mm. longis.

Description.—Bulb small, increasing rapidly by offsets; leaves about 5, 20—23 cm. long; petiole 7—10 cm. long, 4—5 mm. wide, blade broadly-elliptic, 13 cm. long, 6—6.5 cm. broad; scape 27—29 cm. tall; spathe valves lanceolate; umbel 8-flowered, flowers somewhat pendulous; pedicels 1.5—3 cm. long, 1.5 mm. wide; ovary 4 mm. long, 3-celled; tepaltube 1.8 cm. long, green in lower half, white in upper half, 2 mm. at the base, 6 mm. at the apex; tepalsegs oblong to lanceolate, white; perigone-limb 2.6 cm. wide; sepsegs lanceolate, 1.6 cm. long, 6 mm. wide; petsegs oblong, 1.6 cm. long, 8 mm. wide; stamens white, half as long as the tepalsegs, barely if at all united at the base; anthers 5 mm. long, versatile, whitish, pollen whitish; style white, about as long as the expanded limb; stigma white, trifid, lobes globose, 1 mm. long. Type: Traub no. 17, in the Traub Herbarium.

Range.—Colombia; Valle de Cauca; above Cali on road to Buenaventura; in moist shade; alt. 2,000 ft., Foster, Dec. 5, 1946.

Notes.—Collected by Mr. Mulford B. Foster in 1946.

Stenomesson peruvianum Traub, **sp. nov.**—Herba bulbosa; bulba 3 x 2.8 cm., collo 4.5 x 1 cm.; foliis ignotis; pedunculo usque ad 29 cm. alto; umbella plerumque 5-flora; floribus rectis; spatha 2-valvata, valvis lanceolatis usque ad 3.5 cm. longis; bracteolis parvioribus; pedicellis rectis usque ad 4 cm. longis, vulgo aliquantulum parvioribus, inter se longitudine variis; ovario 5—6 mm. longo; perigonio rubro 3—3.5 cm. longo; tubo tepalorum 1.6—2.3 com. longo, in parte inferiore gracili, e medio sursum aprupte dilatato; segmentis tepalorum lanceolato-acutis 1.4—1.5 x 5—7 mm.; poculo staminorum 7 mm. longo, dento uno acuto 2 mm. longo inter filamenta posito; staminibus segmentis tepalorum subaequilongis; stylo paulo exserto; stigmata capitato. Exemplum typicum: Ferreyra 3777, in herbario Traubii access. no. 145.

Description.—Bulb almost round, 3 x 2.8 cm. with neck 4.5 x 1 cm.; leaves unknown (not present on type specimen), apparently produced after the flowers; peduncle slender, up to 29 cm. tall; umbel usually 5-flowered; flowers upright; spathe 2-valved, valves lanceolate, 8—10 mm. at the base, up to 3.5 cm. long; bracteoles smaller; pedicels upright, variable in length, up to 4 cm. long, usually somewhat shorter; ovary 5—6 mm. long; perigone red, 3—3.8 cm. long; tepaltube 1.6—2.3 cm. long, slender in lower half, suddenly dilated from the middle upwards; tepalsegs lanceolate-acute, 1.4—1.5 cm. long, 5—7 mm. broad; staminal cup 7 mm. long, with a single pointed tooth, 2 mm. long, be-

tween the filaments (the tooth is microscopically irregularly notched, which can be seen only under the low power microscope); filaments filiform, 6 mm. long; stamens 8 mm. long, versatile, attached at the middle; stamens about as long as the tepalsegs, style slightly exserted; stigma capitate, rounded. Type: Ferreyra no. 3777; accession no. 145 in Traub Herbarium.

RANGE.—Peru; between Tarma and Oroya, Dept. of Junin; stony habitat; alt. 3300—3400 m., June 29, 1948 (Ferreyra no. 3777).

Fig. 4a. *Zephyranthes puertoricensis* Traub, *sp. nov.*

Zephyranthes puertoricensis Traub, **sp. nov.** Planta bulbosa; bulbo mediocriter magno; foliis linearibus 30—34 cm. longis, 7—9 mm. latis, versus basim apicemque usque ad 4 mm. angustatis; pedunculo sub anthesi 9 cm. alto, post anthesim usque ad 10.7 cm. elongato; umbella uniflora; spatha 2.5—3 cm. longa, dimidio inferiore in tubo connato, ad apicem bifida; ovario 4 mm. longo; pedicello sub anthesi 3.5 cm. longo, post anthesim usque ad 4.5 cm. elongato; perigonio albo, gula subviridi; tubo tepalorum 3 mm. longo; segmentis tepalorum 2-seriatis oblanceolatis 3.8—4 cm. longis, 1.5 et 1.8 cm. latis, segmentis sepalorum quam segmentis petalorum amplioribus; staminibus 2-seriatis 1.3 et 2 cm.

longis; stylo 2.9 cm. longo; stigmate trifido. lobis filiformibus 3 mm. longis; capsula ca. 1 x 7 cm. 3-loculata; seminibus 4 x 6 mm. nigris non alatis.

DESCRIPTION.—PUERTO RICAN ZEPHYRANTHES. Bulb medium sized to large for the genus; leaves linear, 30—34 cm. long, 7—9 mm. wide, narrowed to 4 mm. toward the base and apex; peduncle 9 cm. tall at anthesis, elongating to 10.7 cm in fruit; umbel 1-flowered; spathe 2.5—3 cm. long, united into a tube in lower half, apex bifid; pedicel 3.5 cm. long at anthesis, elongating to 4.5 cm. in fruit; ovary 4 mm. long; perigone white, greenish in throat; tepaltube 3 mm. long; tepalsegs of two different sizes; 3.8—4 cm. long, 1.5—1.8 cm. wide, sepsegs larger than petsegs; stamens of two different lengths, 1.3 and 2 cm. long; style 2.9 cm. long; stigma trifid, lobes filiform, 3 mm. long; capsule about 1 x .7 cm., 3-celled; seeds 4 x 6 mm., black, not winged. Type: Traub no. 151, in the Traub Herbarium; type illustration, Fig. 4a.

RANGE.—Puerto Rico; northwestern corner of the Island.

NOTES.—Collected by Dr. H. F. Winters, of the Federal Experiment Station, Mayaquez, Puerto Rico, several years ago in northwestern Puerto Rico, and sent to the writer for identification in 1949. It is fine species, the first ever described from Puerto Rico, and belongs to the group with filiform stigmatic lobes. It is moderately self-fertile, and can be rapidly increased from seeds.

LOUISIANA'S ST. JOSEPH LILY—xAMARYLLIS JOHNSONII

WYNDHAM HAYWARD, *Florida*

Common in the lower South, especially in Louisiana, where it is even found in flower beds of the State Capitol Grounds, the bulb known popularly as St. Joseph's Lily (Fig. 5) provides one of the puzzles of American horticulture. Like *Lycoris radiata* and *Lycoris aurea*, found in parts of the South, the origin of the plantings of this bulb is lost in the mysterious goings and comings of plants during the colonial period.

This bulb is usually defined botanically as *xAmaryllis johnsonii*, and said to be the first hybrid *Amaryllis*. Dean William Herbert says in his "Amaryllidaceae," page 142, of *xA. johnsonii* that it was first raised by one Johnson, "who had a small garden in Lancashire in 1810," as a cross between the species *A. reginae* and *A. vittata*. Herbert, a great botanist and the greatest amaryllid authority of the first half of the 19th Century, should know his business. He was writing only 27 years after the date he cites.

Herbert also states that he produced the same hybrid at Mitcham in 1811, and at Highelere later, presumably places where he maintained gardens during his ecclesiastical career. He indicates that the bulb is represented by the plate in Redouté's "Liliacées," entitled *A. braziliensis*. Just how Redouté, the court flower painter to the Empress Josephine, could have given the name *A. braziliensis* to *Amaryllis xJohnsonii* is not clear.

Arthington Worsley in his writings on William Herbert in the 1937 Herbertia, (Vol. 4) page 20, shows that Highclere was the estate of Dean Herbert's father, Henry Herbert, the first Earl of Carnarvon, of whom William Herbert was the third son. Worsley also states, in explaining influences which early gave William Herbert his interest in Amaryllids, that "the Geneva Botanic Gardens (A. DC. Pl. Rar. Hort. Genev. t.9) named as *A. carnarvonia* a garden form of *Amaryllis*, near *A. reginae*, but thought to be a hybrid." Herbert cites the name *Amaryllis carnarvoni* (De Candolle) as a synonym of *A. johnsonii*, mentioning that the name *carnarvoni* was improper "since the name *John-*

Fig. 5. *xAmaryllis johnsonii* Johnson ex Herb.

sonii had been previously published in the Hort. Trans., and was in general use."

Herbert also makes this additional statement, which we give for what it is worth: "Johnson's cross was probably accidental, for he thought it a mule between *Vittatum* and *Sprekelia formosissima*, and it passed for such during several years."

Worsley also has something to say about *xA. johnsonii* on page 23 of Herbertia, vol. 4, when writing of Mrs. Bury's famous illustrated work on "Hexandrian Plants." He remarks, "among her illustrations is the alleged hybrid *Hippeastrum Johnsonii*. Around this plant myths have arisen and it is puzzling to reflect how one scientific book after

another has accepted these myths in sincere and perfect faith." Worsley says Mrs. Bury figured "the original plant, *the Johnsonii*, given by the original Johnson himself to Edward Faulkner of Liverpool, guaranteed by the giver to be the original *Johnsonii* and drawn by Mrs. Bury herself. One feels inclined to ask 'If this is not Johnsonii, what is?' But the alleged parentage of this plant is guess work, and very bad at that."

There is an illustration of *xAmaryllis johnsonii* in Dr. Henry Nehrling's German monograph "Die Amaryllis," 1909. It has wider open type flowers than the common type (Fig. 5) found in Louisiana and neighboring states. Possibly the Louisiana form is a sixth or seventh generation seedling of the original *johnsonii*. Or it may be a good species by itself, which has been long thought to be a hybrid by some classic error.

The plant sets seeds, and by that means we may solve the problem. It has almost lost the power to seed, however, and seldom does this without hand pollenization. In the South it is universally propagated and distributed by offsets, the bulbs being divided from time to time.

Actually it is a slow grower, and prefers heavier types of soils than the usual sandy loams of Central Florida, which may explain its scarcity in that area. In Louisiana and Mississippi it is often found in old gardens in rather heavy clayish types of soil and thrives there, growing to twice the size it will make in Florida. It also must have a steady moisture supply to do well, and multiply. It thrives without attention in Louisiana just as *Amaryllis belladonna* Linn., does in the thinner sandy loams of central Florida.

The scapes are dark colored, reddish-glaucous, and the flowers usually four to the umbel. A large bulb will have two scapes. It grows well in pots, several to a large pot, in a heavy mixture, although seldom seen thus. A striking sight is a clump of a dozen or two in full bloom in a street-side garden, the bulbs growing so close they touch each other. It is one of the sights of the Lower South in springtime.

Just how the bulb came to have its name of St. Joseph's Lily is not understood at this time, so far as the writer knows. Some plant detective with a systematic bent can earn a new pair of spurs by looking up all the old and recent plates and printed descriptions of *xA. johnsonii* and its synonyms to see what can be learned as to its real identity.

[Traub—AMARYLLID NOTES, continued from page 43.]

sensis Traub.

Genus *Zephyranthes* Herb., Sect. **Parandranthes** Traub, **sect. nov.**; filaments deltoid, slightly united near the base.

Filamenta deltoidea prope basim parum connata. Typus: *Zephyranthes albicans* (Herb.) Baker

Eucharis bonplandii (Kunth) Traub, **comb. nov.**; syn.—*Hymenocallis bonplandii* Kunth, Enum. Pl. 5: 666. 1850.

Amaryllis bagnoldii (Herb.) Dietr. var **minor** (Speg.) Traub, **comb. nov.**; syn.—*Hippeastrum bagnoldii* var. *minor* Speg., in Anal. Mus. Buenos Aires, Ser. II. 7: 170-171. 1902.

AMARYLLID NOTES

HAMILTON P. TRAUB, *Maryland*

Genus **MOLDENKEA** Traub, **gen. nov.** (*Amaryllidaceae*). Rhizoma bulbosa. Folia sessiles. Scapus nudus. Umbella biflora. Spatha bivalva. Ovarium petaloideum. Flores horizontales. Perigonium tubuloso-infundibulare. Tubus sepalorum (in typo 3.8 cm. longus) angustissimus trigonus basim versus leviter arcuatus incurvatusque limbo perigonii 6-partito brevior (segmentis tepalorum in typo 7.6 cm. longis). Stamina 6 erecta limbo perigonii breviores. Stylus staminaque aequilonga. Stigma minutum obscure 3-lobatum. Typus: **Moldenkea lateritia** (Dietr.) Traub, **comb. nov.** (syn. *Amaryllis lateritia* Dietr., Allg. Gartenz. *18*: 65—66. 1850; Plant Life *6*: 60. 1950.)

Rootstock bulbous; leaves sessile; scape leafless; umbel 2-flowered; spathe 2-valved; ovary petioled; flowers horizontal; perigone tubular-funnel-shaped; *tepaltube* (3.8 cm. long in type), *very narrow, three-sided*, slightly arched and incurved toward the apex; *shorter than the 6-parted perigone limb;* style as long as the stamens, stigma minute, obscurely 3-lobed.

This new genus which apparently belongs in the Tribe *Cyrtantheae* is named in honor of Dr. Harold N. Moldenke, Curator & Administrator of the Herbarium, The New York Botanical Garden, in recognition of his valuable contributions toward the advancement of the amaryllids.

Genus **SANMARTINA** Traub, **gen. nov.** (*Amaryllidaceae*). Planta glabra perennis; bulbo tunicato, in collum subaequilongum attenuato; foliis linearibus planis ad apicem rotundatis, marginibus albis hyalinis microscopice irregulariterque dentatis; pedunculo nudo; umbella circiter 10-flora; spatha ad basim breviter tubulosa, superne bifida; tubo tepalorum apicem versus subattenuato quam limbo infundibuliformi perigonii paullo minus dimidio breviore; segmentis tepalorum 6; staminibus in fauce tubi tepalorum affixis liberis 3 aequalibus vel subaequalibus brevioribus, 3 etiam aequalibus vel subaequalibus longioribus; filamentis rectis, ad basim complanatis, sursum attenuatis, prope apicem filiformibus; stigmate trifido. Typus: **Sanmartina marginata** (R. E. Fries) Traub, **comb. nov.** (syn.—*Hippeastrum marginatum* R. E. Fries, Act. Soc. Upsal. ser. 4, 1(1): 161, pl. 9, figs. 3 & 4. 1905.).

Glabrous perennial plant with tunicated bulb, attenuated into a neck about as long as the bulb; leaves linear, flat, rounded at the apex, with white hyaline margins which are microscopically irregularly dentate; peduncle leafless; umbel about 10-flowered; spathe shortly tubular at the base, bifid above; tepaltube slightly longer than half the length of the funnel-shaped perigone limb of 6 tepalsegs, tepaltube attenuated slightly toward the apex; stamens attached at the throat of the tepaltube, free, three equal or subequal, shorter than the other three which are also equal or subequal; filaments straight, flattened at the base, attenuated upwards, becoming filiform near the apex; stigma trifid.

This genus, native to the Argentine, is appropriately named in honor of the great South American Liberator, San Martin.

This new genus is apparently intermediate between the genus *Zephyranthes* Herb. and *Eustephia* Cav. The straight stamens of two equal to subequal lengths rule it out of *Amaryllis* L., where it was originally placed by R. E. Fries in 1905, and where it was tentatively retained by Traub and Moldenke, Tribe Amaryll. p. 94. 1949.

Habranthus reedii Traub, **nom. nov.** (syn.—*Zephyranthes mendocensis* Baker, Amaryll. 36. 1888; *Habranthus mendocensis* (Baker) Sealy, in Jour. Roy. Hort. Soc. lxii: 208. 1937, non *Habranthus mendocinus* R. Phil., 1862.)

Habranthus tubispathus (L'Herit.) Traub, **comb. nov.** (syn.—*Amaryllis tubispatha* L'Herit., Sert. Angl. 9. 1788, non Ker-Gawl.; *Habranthus robustus* Herb. ex Lodd., Cat. 18: pl. 1761. 1831.)

Habranthus viridiluteus (Kraenzl.) Traub, **comb. nov.** (syn.—*Zephyranthes viridilutea* Kraenzl., in Fedde, Repert, *13*: 118. 1914.)

Habranthus argentinus Traub, **nom. nov.** (syn.—*Zephyranthes lilacina* Speg., in Physis *2*: 40. 1917, non Liebm. 1844.)

Habranthus jujuyensis (Holmb.) Traub, **comb. nov.** (syn.—*Zephyranthes jujuyensis* Holmb., in Anal. Mus. Buenos Aires, Ser. III. *4*: 523. 1905.)

Habranthus holmbergii (Hicken) Traub, **comb. nov.** (syn. *Hippeastrum Holmbergii* Hicken, in Anal. Soc. Ci. Argent. *55*: 235—236, fig. on page 236. 1903.)

Zephyranthes aurantiaca (Lem.) Traub, **comb. nov.** (syn.—*Pyrolirion aurantiacum* Lemaire, in Jardin Fl. pl. 317. 1854; Uphof, Herbertia *13*: 82—83. 1947.)

Zephyranthes smallii (Alexander) Traub, **comb. nov.**, (syn. *Cooperia smallii* Alexander in Addisonia *21*: 1—8, pl. 676. 1939.)

Zephyranthes jonesii (Cory) Traub, **comb. nov.**, (syn.—*Cooperia jonesii* Cory, in Field & Laboratory *18*: 43—46. 1950.)

Zephyranthes brazosensis Traub, **nom. nov.**, (syn.—*Cooperia drummondii* Herb., in Bot. Reg. Lond. pl. 1835. 1836.)

Zephyranthes brasiliensis (Traub) Traub, **comb. nov.**, (syn.—*Cooperia brasiliensis* Traub, in Herbertia *12(1945)*: 38—40. 1947.)

Zephyranthes kansensis (Stevens) Traub, **comb. nov.**, (syn.—*Cooperia kansensis* Stevens, in Trans. Kansas Acad. Sci. *40*: 95, 96, pl. 1, figs. 1—4. 1938.)

Zephyranthes andina (R. E. Fries) Traub, **comb. nov.**, (syn.—*Haylockia andina* R. E. Fries, Act. Soc. Sci. Upsal. 4, *1*: 160—161, figs. 1 & 2. 1905.)

Habranthus unifolius (Arech.) Traub, **comb. nov.**, (syn.—*Zephyranthes* unifolia Arech., in Anal. Mus. Montevideo *2*: 290. 1900, in adnot.)

Zephyranthes pseudocrocus (Solms-Laubach) Traub, **comb. nov.**, (syn.—*Haylockia pseudocrocus* Solms-Laubach, in Bot. Zeit. *65*: 135—136. 1907.)

Tribe *Zephyranthese* (Pax) Hutchinson, subtribe **Zephyranthinae** Traub, **subtr. nov.**; perigone-limb radially symmetrical; stamens subequal

or of 2 different lengths; stamens and style erect, suberect or horizontal; tepalsegs subsimilar.

Limbus perigonii radialiter symmetricus; stamina subaequales vel biseriata; stamina stylusque erecta vel suberecta vel horizontales; segmenta tepalorum subsimiles. Genus typicus: *Zephyranthes* Herb.

Tribe *Zephyrantheae* (Pax) Hutchinson, subtribe **Habranthinae** Traub, **subtr. nov.**; perigone-limb bilaterally symmetrical; tepalsegs of 4 different sizes; style and stamens fasciculate, decinate-ascending; stamens of 4 sets of lengths.

Limbus perigonii bilateraliter symmetricus; segmenta tepalorus 4-seriata; stylus staminaque fasciculata declinato-adscendentes; stamina 4-seriata. Genus typicus: *Habranthus* Herb.

Genus *Zephyranthes* Herb., subgenus **Haylockia** (Herb.) Traub, **subg. nov.** (Syn.—Genus *Haylockia* Herb., Bot. Reg Lond. *16*: pl. 1371. 1830. Type: *Zephyranthes pusilla* Dietr.)

Genus *Zephyranthes* Herb., subgenus **Cooperia** (Herb.) Traub, **subg. nov.** (Syn.—Genus *Cooperia* Herb., Bot. Reg. Lond. pl. 1835. 1836. Type: *Zephyranthes brazosensis* Traub.)

Genus *Zephyranthes* Herb., Sect. **Atamasco** (Adanson ex Greene) Traub, **Sect. nov.**, (Syn.—Genus *Atamasco* Adanson ex Greene. Type: *Zephyranthes atamasco* (L.) Herb.)

Genus *Zephyranthes* Herb., Sect. **Eupyrolirion** Traub, **sect. nov.**; stamens subequal; style straight; peduncle longer than the neck of the bulb.

Stamina subaequales; stylus rectus; pedunculus collo bulbi longior. Typus: *Zephyranthes tubiflora* (L'Hérit.) Schinz

Genus *Zephyranthes* Herb., Sect. **Brachylirion** Traub, **sect. nov.**; stamens subequal; style straight; peduncle included in the neck of the bulb.

Stamina subaequales; stylus rectus; pedunculus in collo bulbi inclusus. Typus: *Zephyranthes pseudocolchicum* Kraenzl.

Genus *Zephyranthes* Herb., Sect. **Tristemanthes** Traub, **sect. nov.**; perigone erect or suberect; style variously curved; functional stamens 3, erect-spreading.

Perigonium erectum vel suberectum; stylus multimodis curvatus; stamina pollinifera 3 erecto-patentes. Typus: *Zephyranthes minima* Herb.

Genus *Zephyranthes* Herb., Sect. **Sibonaya** Traub, **sect. nov.**; stamens of 2 sets of lengths; perigone and style horizontal.

Stamina biseriata; perigonium stylusque horizontales. Typus: *Zephyranthes bifolia* (Aublet) Roem.

Genus *Zephyranthes* Herb., Sect. **Eucooperia** Traub, **sect. nov.**; filaments not united near the base.

Filamenta prope basim non connata. Typus: *Zephyranthes brazo-*

[Traub—AMARYLLID NOTES, continued on page 40.]

Brunsvigia radulosa Herb., summer rainfall form with leaves contemporaneous with the inflorescence, collected near Carolina, Eastern Transvaal. Photo by G. W. Reynolds.

Plate 8

A REVIEW OF THE GENUS **BRUNSVIGIA** HEIST.

R. A. Dyer

[CONTINUED FROM PAGE 83, PLANT LIFE, VOL. 6, 1950, HERBERTIA EDITION.]

The first part of this review, including the introduction and the description of nine species of *Brunsvigia*, was published in Plant Life (Herbertia Edition) *6*: 63—83, 1950. The review is concluded in this second part with the description of eight additional species of *Brunsvigia*, nos. 10 to 17, inclusive.

10. B. radulosa *Herb.* Amaryllid. 281 (1937). *B. burchelliana* Herb. Amaryllid. t. 22, fig. 2 (1837). *B. cooperi* Baker in Fl. Cap. 6: 207 (1896) in part, not of Saund. Ref. Bot. 5: t. 330 (1872).

Description:—[Plate 8 and Fig. 6] *Bulb* underground, with short neck, up to 10 cm. tall and 6-10 cm. in diam. with a hard cartilaginous tunic and sometimes (plants from Karoo) with linear cartilaginous bristle-like strips persisting on the sides of the neck. *Leaves* 4-6, absent or present at time of flowering (depending on environment) spreading on ground, developing up to 25-50 cm. long and 10-20 cm. broad, thick and tough, with asperities on upper or both surfaces, very rarely smooth, margin scabrous. *Peduncle* red-brown or green with pink tinge, compressed, 30-50 cm. tall, 2.5-3.5 cm. broad. *Spathe-valves* ovate-lanceolate or ovate, 5-7 cm. long. *Umbel* 30-60-flowered. *Pedicels* reddish-green or reddish-brown, somewhat glaucous, 20-30 cm. long, 6-10 mm. thick near the base, tapered above, obscurely 3-angled or slightly 6-ribbed. *Perianth* red or pink, fairly regular in shape, 4.5-5.5 cm. long, with tube 2.5-5 mm. long; lobes oblong-lanceolate, 1-1.5 cm. broad. *Stamens* declinate about equal to perianth in length; the filaments attached in the throat of the perianth tube, slightly shouldered towards base; anthers 1-1.2 cm. long. *Style* becoming slightly longer than the stamens. *Ovary* acutely 3-angled, 1.5-4 cm. long, 1-1.75 cm. broad; capsule up to about 4 cm. broad.

Distribution:—The type locality is near Colesburg in the Orange Free State. Specimens are included from Bechuanaland, the central Karoo of the Cape and O.F.S., Basutoland, Natal and Transvaal. It is the only species—and a variable one—from the Great Karoo.

Notes:—Herbert, in 1837, based the 2 names *B. radulosa* and *B. burchelliana* on one and the same leaf specimen collected by Burchell, 2703, near Hondeblats River in the Colesburg division. From the leaf character alone it would have been impossible to identify other plants with it with certainty, but in view of the fact that only one species is recognised from the Karoo area where Burchell collected his plant, there is some justification for not discarding the name. The fact that Baker adopted the name *radulosa* in preference to *burchelliana* in Fl. Cap. 1896, is reason enough for it to be followed here. It is a pity, though, that a distinct species bears such a similar name as *B. radula* which may cause some confusion.

Specimens collected in the same area by Cooper were first identified by Baker as *B. radulosa* and were only later reidentified by him as *B. cooperi*. This was an incorrect identification in Miss Leighton's and my opinion and the name *C. cooperi* has been placed in the synonomy of *B. orientalis*. In addition, I am assuming that other specimens from the central area cited by Baker under *B. gigantea* (*B. orientalis*) and *B.*

Fig. 6. *Brunsvigia radulosa* Herb. Lower left, bulb cut to expose cartilaginous thickening of leaf bases; and upper left, the dry persistent bristle-like strips; collected by L. Meyer from Fauresmith, somewhat north of the Burchell type locality. Right, showing cartilaginous cover of bulb and the persistent bristles of the old leaf bases; plant collected by Dr. Henrici near Jagersfontein in the Orange Free State, some miles north of the Burchell type locality. Photo by H. King.

josephinae are also conspecific with the Burchell specimen named *B. radulosa*. I have gone further and have included plants from Bechuanaland, Transvaal and Natal.

These plants seem to hold together in a natural group, but at the same time show a fairly wide range in time of leaf production, in their

surface and also in the size and shade of flower. Out of this assemblage one could quite conceivably have sorted out a number of specimens and given them specific rank, but this would not for long have successfully masked our ignorance.

In the Orange Free State with low and late summer rainfall the leaves are absent at the time of flowering, whereas in Natal, with medium rainfall, they are produced with the inflorescence (the peduncle arising outside the new leaves). This difference in time of leaf production is probably due to habitat conditions and is referred to in the introductory notes on the genus.

Some specimens have the leaves rough-granular on both surfaces, others are rough on the upper surface alone, but very rarely smooth on both surfaces. There are many other variations; for instance, concerning specimens from the neighbourhood of Fauresmith in the Orange Free State, a collector recorded: "I am sending you today another *Brunsvigia*. The bracts are quite different from all I have seen up to now. In this plant they are red and fleshy, not pink or membranous. The colour of the perianth is more red than the previous specimens."

Several other similar examples of variation could be cited.

11. B. ORIENTALIS *(L.) Ait* ex *Eckl.* Trop. Verz. 7 (1827); Leighton in Journ. S.A. Bot. 14: 83 (1948); Dyer, PLANT LIFE 6: 63-65, Fig. 10. 1950; *Amaryllis orientalis* L. Sp. Pl. 293 (1753); Jacq. Hort Schoenbr. 1: 38, t. 74 (1797); *Brunsvigia* Heist. Monogr. 1753 and 1755; *Haemanthus orientalis* Thunb. Prod. 1: 59 (1794); Fl. Cap. ed. Schult. 298 (1823); *Brunsvigia multiflora* Ait. Hort. Kew ed. 2, 2: 230 (1811); Gawl. in Bot. Mag. t. 1619 (1814) excl. syn.; Herb. Amaryll 280 t.36 fig. 1 (1837); *Brunsvigia gigantea* Heist. ex Schult. f. Syst. 7: 844 (1830); Baker Handb. Amaryllid. 98 (1888); Fl. Cap. 6: 206 (1896) Marloth Flora S.Afr. 4: 123 (1915); *Coburgia multiflora* Herb. in Bot. Mag. sub. t 2213 (1820); *Brunsvigia cooperi* Baker in Saund. Refugium Bot. t 330 (1872) in part; Fl. Cap. 6: 207 (1896) in part, excl. specimens.

Description:—[Plate 9; see also PLANT LIFE, vol. 6, 1950, Fig. 10.] *Bulb* oval or subglobose, subterranean, with a short neck, up to 10-15 cm. tall and broad, covered with a dense membranous tunic. *Leaves*, absent at time of flowering, 2-6, spreading flat on ground, 30-45 cm. long, 7-12 cm. broad, rarely up to 19 cm., obtuse, thickish, with very short pubescence on upper surface, velvety when fresh, sometimes becoming slightly roughish on drying, closely veined. *Peduncle* red-green, 30-50 cm. tall, compressed, 2-3 cm. broad. *Spathe-valves* 2, deltoid, 10 cm. long. *Umbel* 20-40-flowered, rarely up to 80-flowered, spreading into a spherical head in large plants. *Pedicels* 10-20 cm. long, about 7 mm. in diameter near the base, tapering slightly to apex, strongly 6-ribbed, strengthening in fruit. *Perianth* bright red or pink, 5.5-7 cm. long, recurved from the 5 mm. long tube; lobes linear-lanceolate, 5-6.5 cm. long, and about 8-9 mm. broad, recurving towards apex. *Stamens* shorter than the perianth, and filaments inserted in the throat of the perianth tube; anthers dark red, oblong, about 8 mm. long, versatile. *Style* finally slightly longer than the filaments. *Ovary* 3-angled, 2-3 cm. long, 1.5-2

Brunsvigia orientalis (L.) Ait. ex Eckl., reproduced from Jacquin (1797), a typical example of the type of species of the genus. Photo by H. King. (See also PLANT LIFE, vol. 6, 1950, Fig. 10).

Plate 9

cm. broad; *capsule* prominently 3-angled, 4.5-9 cm. long and up to 3 cm. across the angles.

Distribution:—No exact locality for type: Cape Province; western area, including Divisions of Cape Peninsula, Malmesbury, Caledon, Stellenbosch, Robertson, Swellendam and Riversdale, in sandy soil.

Notes:—The original description by Linnaeus does not get us very far. It reads *spatha multiflora corollis inaequalibus foliis linguiformibus* and is supported by a few references to previous literature. There is little doubt that Linnaeus took his specific epithet from the phrase of Swert: *Narcissus indicus orientalis*, which is accompanied by an illustration of a bulb in leaf. Swert's Florilegium was published in 1611-12, forty years before van Riebeeck landed at the Cape to establish a "refreshment centre" for vessels of the Dutch East India Company on their way to and from the East Indies.

There is only one species of *Brunsvigia* recorded from the Cape Peninsula and consensus of opinion identifies it with *Amaryllis orientalis* L. 1753. In 1753 also, Heister described a plant in detail under the generic name *Brunsvigia*, but gave no specific epithet and it was only in 1830 that the epithet *gigantea* was added, and it persisted in use for over 100 years. Here again consensus of opinion has it that Linnaeus and Heister were dealing with the same species, and according to the Rules of Nomenclature, *orientalis* has priority. Jacquin's figure and description of *Amaryllis orientalis* 1797, seem to confirm the identity of the plant fairly soundly with the Cape Peninsula species.

But there is one peculiar feature of previous descriptions of *B. orientalis*. The leaves are usually described as glabrous. It is well recognised now that the Cape Peninsula plant has velvety leaves when fresh. Professor R. H. Compton writes:

"*B. orientalis*, the Cape Peninsula species, with velvety leaves, normally has the bulbs completely (or almost so) below the surface of the sandy ground in which it grows, and the leaves spread out flat on the surface."

The leaves may be slightly roughish on the upper surface when dry.

There has been quite a degree of confusion at various times between the names *B. orientalis* and *B. josephinae*, perhaps because of the general similarity in the irregular flowers, but there are marked differences in detail and the bulbs and leaves are also very different. It seems that Baker included citations in the Flora Capensis, 1896, to not less than 2 distinct species under the name *B. gigantea* (=*B. orientalis*) and 3 under *B. josephinae*. The specimen collected by Shaw in the central eastern Cape and cited by Baker under *B. gigantea* is probably specifically equal to specimens cited by him under *B. cooperi*. His type of *B. cooperi* is probably also equal to *B. orientalis*.

The name *B. cooperi* is based on Ref. Bot. t. 330 (1872), the inflorescence of which shows no distinguishing features from *B. orientalis*, nor does the description indicate any distinction. The leaves, which would not have been present with the inflorescence are described as granular on the face. This could apply to the dry leaves of *B. orientalis*.

although perhaps better to *B. radulosa*. Cooper, who collected mainly in the eastern Cape and Orange Free State, where *B. orientalis* is absent, is given as the collector, but it was a number of years later than the original description that Baker actually cited Cooper numbers under the name. (Previously, he had named them *B. radulosa* Herb.) They do not, however, agree with the type illustration, and the name *B. cooperi* must be regarded as a synonym of *B. orientalis*. The plants named *B. cooperi* by Baker in the Flora Capensis thus require a new name. By taking a liberal outlook we may fall back on *B. radulosa* Herb., which was Baker's identification of *Cooper* 881, before he identified it with his *B. cooperi*.

In view of my difficulty as regards the identity of Baker's *B. cooperi*, I feel it pertinent to quote a letter preserved in the Kew herbarium, written in 1902 by Mr. A. Worsley to Mr. Elwes:

"Dear Mr. Elwes,

B. cooperi or *gigantea?*

"Perhaps this may be only one sp. certainly Baker's descriptions would place them very close together. You will see that he only makes *cooperi* differ from *gigantea* in having 12 to 16 flowers in place of 20 to 30; in having prostrate leaves, granulated and scabrous edged; and in *not* having exserted stamens. I have examined as many as a dozen different bulbs of my *cooperi* in flower at once, and altogether quite 40 different specimens, so that I did not judge by one individual plant. (These were directly imported from the wilds). I found an average of 19 flowers to the umbel (ex. 10 to 28), the leaves 4 to 6, prostrate, scabrous edged and surface granulated. The stamens = limb of perianth.

In all these respects my plants fell in with Baker's *cooperi*. Certainly they had rather more flowers, but this generally happens in cultivated plants.

If now the Kew authorities expand *B. gigantea* to include my plants I cannot see how they leave anything of *B. cooperi*.

Perhaps they are right. In any case Mr. Baker is the one responsible for the existence of *cooperi* as a Sp. I have seen the plate in Ref. Bot. 330 but will see it again to clear up any doubts, and will write you again about it.

I wish those who make new sps. would state in their descriptions in what respects they differ from the older sps! I always do this, but the plan does not commend itself to most writers, evidently."

[Sgd.] *Worsley.*

"From a horticultural point of view, *B. cooperi* as sent to Kew is very distinct in bulb, leaf and habit from *B. gigantea* or *josephinae*."

[Sgd.] *H. J. Elwes.*

(ISLEWORTH, 4/10/2.)

To cite another example of probable confusion of species, one may refer to *B. gigantea* as interpreted by Marloth in his Flora 1915. His description fits mainly *B. orientalis*, but contains elements of *B. josephinae* and the photo reproduced in his fig. 34c, gives the impression that it was growing mainly above ground as in *B. josephinae*. He adds an interesting note referring to *B. orientalis*. "When the seeds are

ripe, the umbel becomes detached and is easily rolled over the veld by the wind, like a St. Catherine's wheel, dropping the seeds here and there in its course. As this takes place during the winter the seeds are able to germinate the same season [winter rainfall area], in fact not rarely they do so even before they are liberated from the capsules. The young plantlets have thus ample time to store water and food materials in the newly formed bulb before the dry season arrives, and then to pass the first summer safely in a dormant state." (the words in brackets are mine, R. A. D.)

Fig 7. *Brunsvigia grandiflora* Lindl., type illustration, Bot. Reg. pl. 1335. Photo by H. King.

Writing about the leaves of *B. orientalis*, Miss Leighton stated that they persist throughout the winter and die down in summer.

12. B. GRANDIFLORA *Lindl.* Bot. Reg. 16:t.1335 (1830); Baker in Fl. Cap. 6:205 (1896) in part. *Amaryllis banksiana* Lindl. in Bot. Reg. 28:t.11 (1842). *A. slateriana* Herb. ex Lindl. Bot. Reg. 30: 76 (1844).

Brunsvigia slateriana Benth. Gen. Plant. 3:727 (1883). *B. banksiana* (Lindl.) Th. Dur. et Schinz. Consp. Fl. Afr. 5:253 (1893). *? Amaryllis grandiflora* var. *banksiana* Herb. Amaryll. 279. t. 32. f. 2 (1837). *? Brunsvigia sphaerocarpa* Baker in Fl. Cap. 6: 207 (1896).

Fig. 8. *Brunsvigia grandiflora* Lindl. (syn.—*Amaryllis banksiana* Lindl., Bot. Reg. 28: pl. 11. 1842). Photo by H. King.

Description:—[Figs. 7 and 8; Plates 10 and 11, left] (from Lindl. Bot. Reg.) *Bulb* oval, with no neck. *Leaves* lingulate, pale green, falcate, flat, erect, roughish at the margin. *Scape* ascending, compressed, some-

what glaucous, a foot and a half high (45 cm.). *Umbel* spreading with about 30 flowers. *Spathe-valves* 2, membranous, pale brown, acuminate. *Pedicels* tapering. *Perianth* 6-parted, nearly equally spreading, segments flesh-coloured, linear-oblong, wavy, bluntish, somewhat recurved; the inner the broadest; stamens inserted into the throat, declinate, rather shorter than the perianth. *Stamens* with subulate filaments. *Style* filiform, declinate, stigma small, obscurely 3-lobed, papillose. *Ovary* 3-celled, with numerous fleshy distichous ovules.

According to the view held this description may be amplified by saying: *Bulb* subterranean 8-20 cm. long, 6-14 cm. diam. with a thick membranous tunic. *Leaves* produced about the same time as the scape, ascending, 20-45 cm. long, 2.5-4.5 cm. broad, somewhat glaucous, flat or somewhat undulate and slightly twisted in the apical third. *Pedicels* about 15-25 cm. long. *Perianth* light to dark pink, 5-7 cm. long; tube 7-8 mm. long; lobes about 12 mm. broad. *Ovary* obtusely 3-angled; capsule scarcely angled.

Distribution:—It was recorded of the type specimen—"This noble addition to the genus *Brunsvigia* was sent us in August 1829, by Mr. Tate, of Sloane St., to whom we have on former occasions had to express our obligations for favours of the same description. It is no doubt a native of the Cape of Good Hope." ? Eastern Cape Province from Uitenhage and Alexandria divisions eastwards into Natal.

Notes:—In dealing with *B. grandiflora* and its allies *B. banksiana* (= *B. slateriana*), and *B. sphaerocarpa*, one is again in a quandary. The figure of *B. grandiflora* is matched among a group of plants with their centre of distribution in the eastern Cape Province where the plants are apparently rather scattered generally. Within the group there is a wide range in the size and colour shade of the perianths, yet no reliable characters for specific distinction have so far been noted. That there are specific distinctions within the group is fairly certain. There are at least three types of leaf which seem too different for normal specific variation, but more important than this, there are at least 2 types of bulb. One might be persuaded that the differences in the leaves are not specific, but in the case of the bulbs the differences seem more fundamental.

The two types of bulb are illustrated in figures Plate 11, left; and Plate 11, right. In Plate 11, left, the bulb is underground and covered with a tunic of membranous leaf bases, while in Plate 11, right, the bulb is mainly above ground and the tunic is partly cartilaginous hardened.

If all herbarium material were complete, one would have a fair foundation to work on, but in spite of a wealth of herbarium material, the specimens collected earlier than 1948 are generally lacking in information on the character of the bulbs, and in many instances the leaves also are absent or immature. In these circumstances the application of the old names is largely guesswork. On the other hand the position would not necessarily be improved by ignoring all the old names and establishing new ones.

While the name *B. grandiflora* has been retained, there is little

Brunsvigia sphaerocarpa Baker, type specimen, which is probably equal to *B. grandiflora* Lindl. Photo by H. King.

Plate 10

Left, *Brunsvigia grandiflora* Lindl., a form from Eastern Cape Province. Story no. 3456. Right, *B. sp. nov.* (No. 13 in text), closely allied to *B. grandiflora*, but the bulb is largely above ground. Photos by H. King.

Plate 11

reason to uphold *B. banksiana* which was based on Bot. Reg. 28: t. 11 (1842) (= *B. slateriana*) (our Fig. 8). It was said at the time to be very near *B. grandiflora*, but that the shorter (peduncles) pedicels seemed to distinguish it satisfactorily, independently of the different colour (dark pink) and the expansion of the flowers. It is now felt that the known variability of species would readily account for the differences mentioned.

The record of *Amaryllis grandiflora* var. *banksiana* Herb., is so vague that it is not worth discussing whether or not it represents the same plant as described later under the name *B. banksiana*.

A herbarium specimen, which matches the type figure of *B. grandiflora* closely, is Alice Pegler 398, collected in February 1901 in the Kentani district. Other closely allied plants from near East London were collected by Galpin 6553, 7813. It is guessed that they had underground bulbs covered by membranous tunics.

Specimens from further west in Alexandria, Albany and Uitenhage districts, collected by Galpin, Story and Holland, have the mature leaves undulate in the apical ⅓ (not flat) and sometimes with a spiral twist. Yet no specific difference has been detected in the flowers from the two areas.

At one time it was considered possible to exclude *B. sphaerocarpa* from the present conception of *B. grandiflora*, but the similarity of the inadequate type material of the former to the latter makes it impossible in the present state of our knowledge. A photograph of one of the type number sheets of *B. sphaerocarpa* (Tyson 1268 from near Mt. Currie at 6,000 ft.) is reproduced, Plate 10. Baker's original description runs on the following lines:

Leaves ligulate, obtuse, smooth, glabrous, 30 cm. long, up to 7.5 cm. broad, margin entire; *Pedicels* 20-25 cm. long; *Perianth* bright red, 6.5-7 cm. long, with a short tube and lanceolate segments about 6 mm. broad; stamens as long as the perianth segments; anthers oblong, 4 mm. long; ovary subglobose, 12-18 cm. in diameter, not at all acutely angled.

I do not find a record on the label of the type of the bright red colour of the flowers which Baker mentions, but Tyson collected a "white variety" of his 1268 under his No. 1711. The colour is relatively unimportant, but Baker's placing of the species in the key next to species with prostrate leaves was misleading. There is little doubt that the leaves are normally ascending.

But the story of *B. sphaerocarpa* is not complete. A study of the *Brunsvigia* population in the type locality of Mt. Currie might reveal hitherto unrecorded distinctive characters, such as the bulb being mainly above ground and covered by a somewhat cartilaginous thickened tunic. This would be sufficient to restore it to specific status.

13. B. sp. [Plate 11, right]. Specimens with bulbs mainly above ground and the bulbs with a somewhat cartilaginous tunic and flowers like those of *B. grandiflora* and *B. sphaerocarpa* have been collected in the King William's Town and Tarkastad districts. An example is shown in Plate 11, right, as mentioned before. The following collector's note

received through Mr. Everitt of Queenstown is of interest.

"We are 10 miles from Hogsback—altitude 5,500 ft. The bulbs grow from Rockford (the name of the farm) right through to within 10 miles of Catheart. They are to be found in the open veld and also on the sides of the river bank and on the cliffs. The bulb does grow above ground level and the leaves are always undulated until they die off in June. The flowers vary in colour from a pale pink. Under cultivation the colourings seem to be much richer in shade."

A very similar plant has also been recorded from further west in the Somerset East district but specific epithets have not been applied to these pending a more thorough investigation of *B. sphaerocarpa*.

14. B. UNDULATA *Leighton* in Fl. Pl. S. Afr. 14: t. 552 (1934).

Description:—*Bulb* up to about 12 cm. tall and 7-8 cm. in diam.; the neck of old leaf bases rising slightly above ground level. *Leaves* arising with the inflorescence, about 15, up to 50 cm. long, 4-10 cm. broad, distichous, lorate, green, shining, glaucous, with undulate margins. *Peduncle* slightly compressed, 4-5.5 x 2-2.5 cm. broad, 30-45 cm. tall, glaucous, spathe-valves reddish, oblong, 9.5 cm. long, 5 cm. broad. *Umbel* 35-80 flowered. *Pedicels* up to about 30 cm. long, 7-8 mm. thick near the base, tapering above, with 6 ribs, glaucous. *Perianth* claret-coloured, 4.5-5.5 cm. long, united into a tube for 5-7 mm. at the base, lobes recurved; the three outer with few glandular hairs within apex, 5-7 mm. broad; inner lobes 6-9 mm. broad. *Filaments* red, inserted in the perianth tube, about equalling the perianth. *Ovary* green, inconspicuously triangular, 1.5 cm. long, 8-10 mm. diam. *Style* red, slightly shorter than the stamens.

Distribution:—Natal: type locality near Pietermaritzburg. Occasional in the mountainous grassveld of central Natal.

Notes:—In view of the near relationship of this species to *B. grandiflora* Lindl. and *B. sphaerocarpa* Baker, I shall quote from the author's remarks at the time of describing the species.

"Unlike other members of the genus, *B. undulata* Leighton, together with its ally, another Natal species, *B. sphaerocarpa*, has fully developed undulate leaves at the time of flowering and the number of leaves is larger than is usually the case. Our species differs from *B. sphaerocarpa* in the size and set of the flowers; the segments of the latter being longer and narrower and considerably recurved. The umbel in *B. undulata* is somewhat semi-globose, instead of the more usual globose form, and the ascending pedicels are reminiscent of *Nerine* rather than *Brunsvigia*. The deep ruby-color of the flower, too, is unusual in the genus."

A large specimen collected near Nottingham Road by Mrs. J. L. Smith had an umbel with 80 flowers. Specimens from the Estcourt district collected by J. Acocks showed considerable variability in the leaves. The margin varied from slightly undulate to markedly crisped.

15. B. JOSEPHINAE (*Red.*) *Gawl.* in Bot. Reg. sub tt. 192-193 (1817); Baker in Fl. Cap. 6:205 (1896) in part. *Amaryllis gigantea* van Marum.

Brunsvigia josephinae (Red.) Ker-Gawl., habit of bulbs in a kloof near Worcester. Photo by H. King.

Plate 12

in Nat. Verh. Bat. Maats. Weetens. 3, 1: 345 (1805); Gard. Chron. 103:60 (1938). *Amaryllis josephinae* Red. Lit. 7, tt. 370-372 (1813). *Brunsvigia josephinae* var. *augustifolia* Gawl. in Bot. Reg. t. 192-3 (1817). *Coburgia josephinae* Herb. in Trans. Hort. Soc. 4:181 (1822). *Brunsvigia josephinae* var. *josephine* Herb. in Bot. Mag. 52: t. 2578 (1825). *Amaryllis josephiniana* and var. *griffiniana* Herb. Amaryll. 278 (1837). *Brunsvigia gigantea* (van Marum) Traub. in Herbertia 5: 132-5 (1938), non Heist. ex Schult. (1830).

Fig. 9. *Brunsvigia josephinae* (Red.) Ker-Gawl., type of the species from Redoute (1813). Photo by H. King.

Description:—[Fig. 9, and Fig. 10, left; and Plate 12]. Bulb exposed mostly above ground, oval, often without a distinct neck in the wild state, up to 30 cm. long and 20 cm. diam., with a dense covering of membranous tunics. *Leaves* (absent at time of flowering) 8-20, subereet, oblong, the largest up to 90 cm. long and 5-20 cm. broad, the younger inner ones smaller, glaucous, glabrous, smooth, entire, thick, closely veined, sometimes slightly undulate towards the tip, curved. *Peduncle* compressed usually up to about 45 cm. tall but even up to 90 cm., 2.5-5 cm. broad. *Spathe-valves* 2, tinged with red, 15 cm. long, keeled, drying as flowers develop. *Umbel* with 20-30 flowers or occasionally with up to 50 or 60 and the larger ones with flowers spreading almost into a full

circle with a diameter of nearly 1 m. *Pedicels* reddish-violet, 25 cm. long and up to 30-40 cm. on maturity, 1.25 cm. thick near the base and narrowing gradually to the ovary, 6-ribbed when fresh and 3-angled when dry. *Perianth* red with dull yellowish-orange on the outer surface towards the tube, 7-9 cm. long, with a subcylindric tube 1 cm. long but with the margins of the lobes free slightly further to the base; outer lobes linear-lanceolate, 11-12 mm. broad near the base; inner lobes linear, acuminate, 9-10 mm. broad, spreading and recurving towards apex to variable degree, 3 upper lobes often strongly recurved. *Stamens* shorter than the perianth with the bases of the filaments united to the perianth into a tube for 1 cm.; anthers oblong, violet-purple before dehiscence, 1.5-2 cm. long. *Style* finally slightly longer than the filaments. *Ovary* oblong or turbinate, not strongly angled, 2-2.5 cm. long, 1.25-1.5 cm. broad; capsule membranous, not strongly angled, up to 4 cm. long and 2.5 cm. broad across the angles, often splitting irregularly on dehiscence.

Distribution:—No exact locality for the type specimen: Worcester, Swellendam hills, Laingsburg, Uniondale, Somerset East.

Notes:—Redonté gives the original habitat of the bulb as the interior of Africa and this may be taken to mean inland from the Cape Peninsula.

It would be expected that with Redonté's magnificent figure and full description it would not be difficult to associate it correctly with plants now to be found in the wild state. While the flowers are matched closely the bulb is drawn rather diagramatically. Plants from Worcester district agree with the Redonté inflorescence in all its magnificence, but the bulbs are largely exposed above ground and have a thick covering of old leaf tunics. It seems probable, however, that these would have been removed from the bulb imported to Holland and their absence from Redonté's illustration should not be given too much weight.

Gawler established the variety *B. josephinae* var. *augustifolia* for a plant figured in Bot. Reg. 1817, based on the narrower leaves, but judged on the Worcester plants I agree with Mr. Griffin, the grower, that it is likely to be as much a question of age as any permanent distinction. The author gave the locality of the variety as Hantam district which is near Calvinia and not many miles north of Worcester. Herbert saw fit to alter the varietal name to *Griffiniana*.

Backhouse, writing of Amaryllids early in April 1840, while travelling from Piquetberg to Worcester, stated: "among them the beautiful *Brunsvigia josephinae*, called Marsbloem, March flower, with a large spreading head of deep crimson, lily-like flowers, was in blossom in some heathy places. The bulbs of some of these plants are almost as large as a child's head."

Professor Compton reported that the *Brunsvigia* in the kloofs at Worcester identified by Mrs. Isaac (Miss Leighton) as *B. josephinae*, has a very large bulb with great numbers of bifarious old tunics and the bulbs are often half or less embedded in soil. This, he says, is the case also with the same species from near van Rhynsdorp, where the plants grow on a steep surface of large shale fragments and often expose at least ¾ of the bulbs.

Mr. van Breda, Officer in Charge, Veld Reserve, Worcester, wrote on 11/6/48:

"You ask whether it is usual for the peduncle to remain attached to the bulb in the case of the large *Brunsvigia*. I have carefully noted this and can safely say that it is most unusual and that in most cases the peduncle is broken off at the base by the wind and blown away. However, it appears that if the plant grows in a place protected from the wind the peduncle comes out in much the same way as that of the Aloes. I have

Fig. 10. Left, *Brunsvigia josephinae* (Red.) Ker-Gawl.; an old bulb most likely not less than 100 years old; collected at Worcester by van Breda. Right, *Brunsvigia litoralis* R. A. Dyer, *sp. nov.*, the bulb for comparison with that of *B. josephinae*, left. Photo by H. King.

actually come across two plants thus protected. I could send you a few peduncles of last season for examination as there is a small valley into which they are blown."

The remarkable nature of the plant is shown in the accompanying photos [Fig. 9, and Fig. 10, left; and Plate 12].

By counting the leaf tunics on an old bulb and allowing for up to 20 leaves per annum, its age was estimated at not less than 60 years, and making allowance for the disintegration of the tunics from the nude butt of the bulb it is likely to have been in the neighborhood of 100

years. Herbert estimated the age of the Malmaison plant at about 100 years, which is probably no exaggeration.

Herbert retained *B. josephine* under the genus *Amaryllis* [= *Cobergia* Herb.] with the Cape belladonna, but changed the spelling of the epithet to *josephiniana* and also unnecessarily created the varietal name *griffiniana*.

In the notes on *B. orientalis*, I have mentioned possible confusion by Marloth of a plant of *B. josephinae* with that species. According to the present classification it seems that Baker in Fl. Capensis 1896, cites specimens belonging to 3 or 4 distinct species under the name *B. josephinae*, but this opinion is based on locality records and not on an examination of the actual specimens.

Having aligned *B. josephinae* with plants from inland localities, I have in the residue a plant from coastal districts with a very similar inflorescence, but which differs sufficiently for specific separation. I have examined living material from the coast near Port Elizabeth. The main points of difference are its generally smaller habit, its subterranean bulb, its slightly shorter perianth lobes and relatively longer perianth tube. This species has been given the name *B. litoralis*.

16. **B. litoralis** R. A. Dyer, **sp. nov.** affinis *B. josephinae* Gawl. bulbo minore subterraneo corollae tubo leviter longiore lobis angustioribus differt.

Bulbus ovoideus, usque 15 cm. longus, 10 cm. diam. in collum breve productus. *Folia* hysterantha, plus minusve 12, suberecta, distieha, oblonga, 30-40 cm. longa, 5-7 cm. lata, glauca, glabra, plana, apicem versus leviter torta. *Pedunculus* 15-30 cm. longus vel nonnunquam usque 60 cm. longus, 2.5-3 cm. latus, compressus. *Spathae-valvae* 2, carinatae, 6-7 cm. latae. *Umbella* 14-40 flora. Pedicelli 15-20 cm. longi, vel raro usque 27 cm., basin versus 7-10 mm. lati, leviter angulati. *Perianthium* rubrum, 7-8.5 cm. longum; tubus 1.25-1.5 cm. longus; lobi 8-9 mm. lati, 3 superiores valde recurvi, 3 inferiores patentes vel leviter recurvi. *Stamina* biseriata, perianthio breviora; antherae 1.25 cm. longae. *Stylus* filamentis leviter longior. *Ovarium* oblongum plus minusve 1.5 cm. longum, 1 cm. latum; capsula usque 3.5 cm. longa, obtuse triangulata.

Distribution:—Cape Province: Port Elizabeth Division; 5-7 miles from Port Elizabeth near Schoenmakerskop, March, Story and Holland 3463 (type); Holland in Nat. Herb. Pretoria 28395; Aug. (leaves) 28396; Parsons Vlei, March, Long 527; 545; Port Elizabeth (cult. Pretoria) Mogg; also Cruden 463; Paterson 986; Holland. Knysna Division (cult. Kirstenbosch) March, Sibbert.

Description:—[Fig. 10, right; and Fig. 11]. *Bulb* completely subterranean, oval with a short stout neck, 15-20 cm. long and 10-13 cm. diam. with a brown tough tunic and a large butt at the base. *Leaves* (absent at time of flowering) about 12, suberect, oblong, 30-40 cm. long, 5-7 cm. broad, somewhat glaucous, glabrous, smooth on both surfaces, entire, thickish, closely veined, usually with a half twist near the apex. *Peduncle* reddish, 15-30 cm. tall, 2.5-3 cm. broad, flattened. *Spathe-*

valves 2, reddish, keeled, scarious. *Umbel* with 14-40 flowers, averaging about 20. *Pedicles* reddish, glaucous, spreading, 15-20 cm. long, rarely up to 30 cm. in fruit, 7-10 cm. thick near the base, narrowing gradually to the ovary, slightly angled. *Perianth* mainly deep red with small crystal-like yellow flecking, 7-8.5 cm. long; tube 1.25-1.5 cm. long; the lobes about 7 cm. long, linear, 8-9 mm. broad; the 3 inner slightly nar-

Fig. 11. *Brunsvigia litoralis* R. A. Dyer, *sp. nov.*; showing bulb and suberect leaves (photo taken a few days after plant had been collected and they are slightly withered). Photo by H. King.

rower than the outer; the 3 upper curled back; the 3 lower slightly recurved; the 3 outer slightly hooded and with few hairs within the tips. *Stamens* shorter than the perianth, those opposite the outer perianth lobes slightly longer than the others, with bases of filaments united to perianth into a tube 1.25-1.5 cm. long; anthers 1.25 cm. long. *Style* finally slightly longer than the filaments. *Ovary* oblong, more or less 1.5

cm. long and 1 cm. broad, not strongly angled; capsule membranous, up to 3.5 cm. long.

Notes:—Previously this species has been classified under *B. josephinae* Gawl., but as pointed out under that species it differs in its distribution in the underground bulb, in the proportions of the perianth, shorter anthers, and in its generally smaller habit and leaves with a half twist near the apex. The flowers are, however, very similar in general appearance. The name *litoralis* has been given because of the coastal habitat as opposed to the inland habitat of *B. josephinae*.

I am grateful to Mr. F. H. Holland and Mr. R. Story for providing notes and living specimens from near Port Elizabeth. To quote from Mr. Story's notes:

"Flowers 14-40 in a head, averaging 20; when seeds ripen the peduncle tissue breaks down to a wet pulpy mass about ground level. This allows the inflorescence to come away very easily. The plants occur 7½ miles from the Port Elizabeth Post Office on the road to Schoenmakerskop via Humewood, gray sand at roadside. The grass, *Cynodon* is dominant; surrounding bush now mainly exotic—*Acacia*, with a few relics of *Sideroxylon*, *Rhus*, *Cassine*, etc."

There is little doubt that the city of Port Elizabeth will eventually extend over this site and B. litoralis will gradualy give place to other less beautiful objects of habitation.

The information about the Knysna record is scanty. More exact information is desirable and it is probable that the plant occurs at different points on the coast between Knysna and Port Elizabeth. One may assume that the specimens from near Port Elizabeth, quoted by Baker under *B. josephinae*, belong here.

17. B. sp.

Distribution:—Namaqualand: Springbok.

Notes:—Specimens collected by H. Herre near Springbok, Namaqualand appear to require specific description. Fuller information is being sought. The bulb is partly exposed above ground and is covered by a cartilaginous tunic. It is said to produce a few ascending tough ovate-oblong leaves and has a medium sized inflorescence. The preliminary information on the bulb and leaf characters make it a particularly interesting species for further investigation. This is a fitting note on which to conclude my review.

COMMENTS ON THE NEW R. H. S. NARCISSUS CLASSIFICATION

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I. R. H. S. REVISED NARCISSUS CLASSIFICATION, EFFECTIVE AS OF JANUARY 1, 1950

(i) "Colored" means yellow or some other color than white. (ii) "White" means white or whitish. (iii) The length of a perianth segment is the extreme length measured on the inside from its junction with the corona along the midrib to the extreme tip, and the length of the corona is the extreme length measured from its junction with the perianth to the end of its furthest extension when the edge is flattened out.

Division 1. TRUMPET NARCISSI [of Garden Origin]

Distinguishing characters: one flower to a stem; trumpet or corona as long or longer than the perianth segments. (a) Perianth colored; corona colored, not paler than the Perianth. (b) Perianth white; corona colored. (c) Perianth white; corona white, not paler than the perianth. (d) Any color combination not falling into (a), (b), or (c).

Division 2. LARGE-CUPPED NARCISSI [of Garden Origin]

Distinguishing characters: One flower to a stem; cup or corona more than one-third, but less than equal to the length of the perianth segments. (a) Perianth colored; corona colored, not paler than the perianth. (b) Perianth white; corona colored. (c) Perianth white; corona white, not paler than the perianth. (d) Any color combination not falling into (a), (b), or (c).

Division 3. SMALL-CUPPED NARCISSI [of Garden Origin]

Distinguishing characters: one flower to a stem; cup or corona not more than one-third the length of the Perianth segments. (a) Perianth colored; corona colored, not paler than the perianth. (b) Perianth white; corona colored. (c) Perianth white; corona white, not paler than the perianth. (d) Any color combination not falling into (a), (b), or (c).

Division 4. DOUBLE NARCISSI [of Garden Origin]

Distinguishing character: double flowers.

Division 5. TRIANDRUS NARCISSI [of Garden Origin]

Distinguishing characters: Characteristics of *Narcissus triandrus* clearly evident. (a) Cup or corona not less than two-thirds the length of the perianth segments. (b) Cup or corona less than two-thirds the length of the perianth segments.

Division 6. CYCLAMINEUS NARCISSI [of Garden Origin]

Distinguishing characters: characteristics of *Narcissus cyclamineus* clearly evident. (a) Cup or corona not less than two-thirds the length of the perianth segments. (b) Cup or corona less than two-thirds the length of the perianth segments.

Division 7. JONQUILLA NARCISSI [of Garden Origin]

Distinguishing characters: characteristics of any of the *Narcissus Jonquilla* group clearly evident. (a) Cup or corona not less than two-thirds the length of the perianth segments. (b) Cup or corona less than two-thirds the length of the perianth segments.

Division 8. TAZETTA NARCISSI [of Garden Origin]

Distinguishing characters: characteristics of the *Narcissus Tazetta* group clearly evident.

Division 9. POETICUS NARCISSI [of Garden Origin]

Distinguishing characters: characteristics of the *Narcissus poeticus* group without admixture of any other.

Division 10. SPECIES AND WILD FORMS AND HYBRIDS

All species and wild, or reputedly wild, forms and hybrids.

Division 11. MISCELLANEOUS NARCISSI

All narcissi not falling into any of the foregoing divisions.

II. COMMENTS ON NEW R. H. S. CLASSIFICATION

The new Revised System for the Classification of Daffodils is given here for the benefit of those who may not be familiar with it; however, since it has been in use for a year, doubtless nearly all fanciers have familiarized themselves with the changes which have been made. Chief of these are as follows: Classes 1b and 1c have been reversed, the bicolor trumpets now preceding the whites. Class 1d has been added to take care of new colors such as reversed bicolors. The old Division 4 has been eliminated, Class 4a becoming 2c, and Class 4b is now 3c with some exceptions. Pink cupped varieties in 4a become 2b, and varieties formerly listed as 4b but having cups with colored edges become 3b. As with the trumpet class, there is an extra division (d) in both sections 2 and 3 to allow for reversed bicolors. The doubles in Class 10 now become Class 4, and Class 10 now includes the species. Classes 6 and 7 have been subdivided, and a new section, Division 11 has been added to care for any Daffodils not falling in the preceding groups.

On the whole it would seem that the new classification is better and simpler than the one which it supersedes, although it is not without defects and will not be approved by every one. Some of us who have had a sentimental attachment for the old leedsiis will somewhat regret their amalgamation with classes 2 and 3; not so much that they are not more appropriately placed here but that there seems some inconsistency in placing the pinks such as WILD ROSE and MRS. R. O. BACKHOUSE in the same class with FERMOY and HADES (comparative examples of recent

and older varieties). Then it does not seem that FAIRY CIRCLE and SYLVIA O'NEILL belong with CORONACH and LIMERICK. A perfect classification, would, of course, be impossible. Many varieties are border line flowers which might be listed in either of two classifications depending on which of a number of blooms were measured, or the weather conditions effecting color in the season the variety was placed.

At present there is little need for Divisions 6 and 7 being divided for differences in the length of the coronas. Future developments may well justify these allowances and may further merit a division in color here since we already have white and bicolor representatives in these groups in addition to the familiar yellows; also, yellow flowers belonging to Division 5 are appearing.

Criticism of the above mentioned groups would be of little consequence, but in view of the vastly greater number of Daffodils in Division 2, it would seem justifiable even at the expense of a more cumbersome classification to segregate the "pinks" from the "red cups," and perhaps likewise, the "red and yellows" from the "all yellows." It might be argued that some of the "red cups" are yellow selfs in certain areas and under some conditions, but it is as true that the "pinks" not infrequently become white flowers. Since one of the primary purposes of the classification is the guidance of exhibitors, and where one variety may be entered in each section of Divisions 5, 6 and 7, there are apt to be a dozen each of "red and yellow" flowers and "self yellow" competing in the same class. Could there not be two more subdivisions added to each of Divisions 2 and 3?

Some feel that since this is a horticultural rather than a botanical classification, the species should be left in the groups with the hybrids which are obviously derived from them. This might well be true but since some species have not been used extensively, if any, in breeding, a separate division for them may be in order. If I may be so bold as to suggest changes I would like to see incorporated in the classification, it would be to change Divisions 2 and 3 to read somewhat as follows:

(a) Perianth yellow; corona yellow, not paler than the perianth.

(b) Perianth yellow; corona orange or red.

(c) Perianth white; corona orange or red.

(d) Perianth white; corona pink, salmon or buff.

(e) Perianth white; corona white, not paler than the perianth.

(f) Any color combination not falling into (a), (b), (c), (d), or (e).

It may be easily seen that some difficulties might be encountered in deciding whether the corona should be classed as orange or salmon, for instance; but such a decision should not be more difficult than deciding if a cream perianth was white or yellow.

CHROMOSOMES OF TWO NARROW-LEAVED AMARYLLIS SPECIES, AND THE GENERIC TYPE SPECIES, AMARYLLIS BELLADONNA L.

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In most systematic treatments of the genus *Amaryllis* Linn., the genus has been first subdivided into two groups by the character of the leaf. Traub and Moldenke (1949) have followed this natural grouping in their recent revision of the genus. They place three subgenera, *Chilanthe*, *Phycella*, and *Rhodophiala* in the narrow-leaved supra-group with leaves 3 to 13mm. broad, while five subgenera, *Lais*, *Aschamia*, *Macropodastrum*, *Omphalissa* and *Scalyana*, constitute the broad-leaved supra-group characterized by leaves 2.5 to 5.7 cm. broad.

A number of species in the broad-leaved supra-group have been studied cytologically by Inaryama (1937), Sato (1938), Neto (1945), and Baldwin and Speese (1947). The plants studied by these workers had, in every case, a basic chromosome number of eleven (x = 11) and included three diploid (2n = 22), one triploid (2n = 33), two tetraploid (2n = 44), and one septaploid (2n = 77) species and one tetraploid species hybrid. No cytological report has been made on any of the narrow-leaved species or on the type species of the genus, *Amaryllis belladonna* Linn.

This paper is a preliminary report on the karology of two species of the narrow-leaved subgenus *Chilanthe*, *Amaryllis advena* Ker-Gawler and *A. chilensis* L'Héritier, and on the type species of the genus, *A. belladonna* Linn. A bulb of each species was sent to the Blandy Experimental Farm by Dr. H. P. Traub. A second bulb of *A. advena* was secured from Mr. Wyndham Hayward. As yet none of these bulbs have flowered at the farm.

MATERIALS AND METHODS

The root tips used in this study were treated with 0.2% colchicine for two to three hours and were then fixed in acetic-alcohol (3 parts 95% ethanol : 1 part glacial acetic acid) for 12 to 24 hours. The tips were stained in aceto-carmine for periods up to 12 hours. This was followed by a five minute maceration in Warmke's solution (1935). When the growing region of the root tip became clearly differentiated, the rest of the root was cut away and a drop of 4% iron alum was added to the maceration fluid to prevent further destaining. After maceration the root section was washed with 95% ethanol, transferred to a drop of aceto-carmine on a clean slide and shredded with steel needles. Temporary preparations were sealed with a mixture of 50% wax and 50% gum arabic. Slides were made permanent by the schedule of either P. C. Burrell (1939) or L. P. Johnson (1945). Drawings were made with the aid of a Zeiss camera lucida at a magnification of X2,500.

An attempt was made to idiogram the chromosome complements of the three species but the differential action of the colchicine treatment made this unfeasible. However chromosome formulas could be determined by using the ratio of the short arm to the total length of the chromosome. The chromosomes were divided into long (L), medium (M), and short (S) on the basis of total length measurements. The

Fig. 12. Somatic chromosomes of *Amaryllis* species: A. & C. *Amaryllis advena* Ker-Gawl., B, *Amaryllis chilensis* L'Hérit., and D. *Amaryllis belladonna* Linn. Drawn at X2500.

position of the centromere region was determined by using the short arm/total length ratio. If this ratio closely approached .50 the centromere was called median (v); if the ratio was much less than .50 but greater than .25 the centromere was judged to be sub-median (l). Any chromosome with a ratio below .25 was classified as having a sub-terminal centromere (j).

CHROMOSOME OBSERVATIONS

Amaryllis advena. Fig. 12, A and C. 2n = 18 = 2:Sv, 1:Sj, 8:Ml, 6:Mj, 1:Ll. Four metaphase figures were measured.

Several chromosomes in the complement of this species have no apparent homologues. These are the Sj chromosome, the Ll chromosome, and one Ml chromosome whose centromere is distinctly more median than that of the other M chromosomes. The S chromosomes and the L chromosome are readily identified; the M chromosomes are too similar for easy individual identification within their respective groups.

Amaryllis chilensis. Fig 12, B. 2n = 18 = 2:Sv, 2:Sl, 2:Ml, 11:Mj, 1:Ll-j Three metaphase figures were measured.

This species also appears to have two unpaired chromosomes since only one L chromosome is found in the complement. However this chromosome may be merely a stretched or distorted Mj chromosome as its measurements approach the range of the M chromosomes. In one figure this chromosome was difficult to interpret because of folding. The other chromosome groups are easily distinguished.

Amaryllis belladonna Linn. Fig 12, D. 2n = 22 = 2:Sv, 6:Sl, 2:Ml, 6:Mj, 4:Ll, 2:Lj. Three metaphase figures were measured.

Like several other broad-leaved *Amaryllis* species, *A. stylosa*, *A. calyptrata*, and *A. elegans* Sprengel, which have been studied cytologically *A. belladonna* Linn., is an x = 11 type of plant. The two Sv chromosomes are quite readily identified. The rest of the chromosomes are too similar within their groups for individual identification although the Ml and Lj pairs can usually be distinguished.

DISCUSSION

In the light of these facts several hypotheses can be advanced:

1. The narrow-leaved and broad-leaved supra-groups of this genus are quite different cytologically. This may be due to a difference in origin or at least a divergent evolutionary history. The fact that no crosses between the two groups are known supports this belief.

2. The 2n = 18 species may have arisen from one or more of the 2n = 22 species by the loss of four chromosomes, not necessarily paired. If this is so *A. belladonna* Linn. does not appear to be the species that functioned in the development of the two narrow-leaved forms considered here as a comparison of the most easily distinguished chromosomes, i.e., the S ones, shows that the four chromosomes lost would always have to be S chromosomes. This does not agree with the cytological picture of these two narrow-leaved species. Likewise the opposite view, that an 18 chromosome species gave rise to a 22 chromosome species by the duplication of four chromosomes, does not seem plausible at this time from a comparison of the chromosome complements with 18 and 22 chromosomes respectively.

3. Chromosomes, in the narrow-leaved species, which have no homologues may be the result of natural dislocations or fragmentation in a clone.

Preliminary as this report is it demonstrates the need for further cytological work in this genus especially along the following lines: (1) a study of the karology of other narrow-leaved species especially those of the two uninvestigated subgenera *Rhodophiala* and *Phycella*, (2) cytological study of at least the type species of each of the broad-leaved subgenera, and (3) meiotic studies of both supra-groups when possible.

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VALLEEVUE AMARYLLIS TRIALS

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The Garden Center of Greater Cleveland

In order to determine the relative merits of the available strains of *Amaryllis* on the market today, the Garden Center of Greater Cleveland, in cooperation with Western Reserve University, established a series of comparative strains trial tests in its greenhouses at Valleevue Farm.

Varieties of Dutch origin were chosen because data previously collected indicated that these strains were superior to America's field grown strains. Collections were received from Ludwig & Co., Hillegom, Warmenhoven and Son, and H. deGraaff and Son, Lisse. These represent the principal sources of *Amaryllis* from Holland.

Five bulbs of each variety were received during early January and planted in 8" pots with a uniform soil mixture of soil, sand, compost and cow manure. Due to the variation in bulb size, shipping condition, with possible injury from cold in transit, special treatment by the various growers and selection of bulbs by grower for shipment, a permanent rating will be issued after three years' testing.

This initial rating designated as Rating 1950 covers the performance of these varieties during the blooming season of spring 1950. Named varieties of *Amaryllis* vegetatively propagated represent the finest available sources on the American market. These varieties are grown in Hol-

land at great expense to the growers in greenhouse space and the necessary three year developmental period, naturally demand higher prices than the seed- or bulb-grown American hybrids.

It has been observed that certain named varieties appear to vary in color or throat marking suggesting that several varieties nearly identical in color and form might have been used as propagating stock. Wherever this condition existed those varieties were rated lower and further checking will be made to rogue the stock.

This initial rating designated as Rating 1950 covers the performance of these varieties during the blooming season of spring 1950:

The letter rating of AA—Superior; A—Excellent; B—Good; C—Fair, for discard, is based on clean color, floret size, number of scapes per bulb, number of florets per scape, floret substance, length of scape and vigor of foliage.

SALMON: Mona Lisa *(Ludwig)*. Salmon suffused pink. Color irregular and fades, 2 scapes 15", 3 to 4 five and one half inch blooms. 1950 rating—C. Queen's Page *(Warmenhoven)*. Clean salmon orange. 3 scapes, 20" tall with 4 eight inch blooms. Rating 1950—A. [Fig. 13, upper left.] Salmon Joy *(Ludwig)*. Salmon scarlet blending to deep red at base of petals—occasional scratchy white line on throat, heavily substanced floret, wide open. 3 scapes 22" tall with 4 nine inch blooms. Rating 1950—A. [Fig 13, upper right.] Sweet Seventeen *(Warmenhoven)*. Frosty salmon rose on white giving a flesh pink tone to the floret. 3 scapes 20", with 4 nine inch blooms. Rating 1950—B.

ORANGE SCARLET: Bordeaux *(Warmenhoven)*. Clean light orange scarlet blending to deep scarlet in throat. 2 scapes 26" tall with 4 ten inch florets. Rating 1950—A. Caruso *(Ludwig)*. Orange scarlet intensifying at base of petals, slight striation at base of petals. 2—3 scapes 24" tall with 4 eight inch blooms. Rating 1950—B. Invincible *(Ludwig)*. Smooth orange scarlet blending into deep red in throat. 2—3 scapes 22" tall with 4 nine inch blooms. Rating 1950—A.

SCARLET: Fire King *(Ludwig)*. Scarlet deepening to medium red in throat, floret long tubed. 2—3 18" scapes with 4 six inch florets. Rating 1950—B. Halley *(Ludwig)*. Clean, frosty scarlet with great substance and growth. 3 scapes 22" tall with 3—4 eight and one half inch florets. Rating 1950—AA. Ludwigs Scarlet *(Ludwig)*. Glistening scarlet blending to deep red in throat, color breaks to yellow green at base of petals. 3 scapes 26" tall with 4 seven and one half inch blooms. Rating 1950—B. Prince of Orange *(Warmenhoven)*. Clean scarlet blending deep in throat, fades as florets age. 3 scapes 19" tall with 3—4 eight inch blooms. Rating 1950—B. Scarlet Beauty *(Warmenhoven)*. Scarlet blending to medium red to dark red in throat, possesses a velvety sheen that glistens. 3 scapes 24" tall with 4 nine inch blooms. Rating 1950—A. Scarlet Leader *(Ludwig)*. Scarlet suffused with red, suffusion line intensifying in throat. 3 scapes 22" tall with 4 seven inch florets. Rating 1950—B. De Graaff Scarlet Seedlings. Varying shades of scarlet, flat wide open florets. 2—3 scapes 20—24" tall with 4 six to eight inch florets. Rating 1950—B.

PINK: DORIS LILIUM *(Ludwig)*. Light rose pink deepening to rose in throat, very heavy substance, 3 scapes 20″ tall with 4 six inch blooms. Rating 1950—A. FIDELITY (*Ludwig*). Pale rose pink with green at base of petals, clean color. 3 scapes 14″ tall with 3 to 4 five inch blooms. Rating 1950—B. LIBERATOR (*Ludwig*). Salmon rose with deep rose red throat, mid ribs of lower petals white. Color appears as a suffusion of rose salmon on white giving a netted appearance. 3 scapes 26″ tall with 3—4 seven inch bloom. Rating 1950—B.

Fig. 13. Valleevue *xAmaryllis* Trials—(upper left) QUEEN'S PAGE (Warmenhoven); (upper right) SALMON JOY (Ludwig); (lower left) QUEEN OF THE WHITES (Warmenhoven); and (lower right) SUPERIORA WHITE (van Meeuwen-de Graaff).

DEEP ROSE: Violetta *(Warmenhoven)*. Medium to deep rose with a light rose throat. Light rose midribs. 3 scapes 22″ tall with 3—4 eight inch florets. Rating 1950—B. De Graaff Rose Seedlings. Shades of rose with 2 scapes 20—24″ tall with 4 seven to eight inch florets. Rating 1950—A.

LIGHT AND MEDIUM RED: American Express *(Ludwig)*. Huge clean, medium red blending to deep red in throat, substance excellent for large floret. 2 to 3 scapes 28″ tall with ten inch florets. Rating 1950—AA. Anna Paulowna (*Warmenhoven*). Glistening light salmon red with deep red in throat, fades as it ages. 2 to 3 scapes 26″ tall with 4 eight inch florets. Rating 1950—B. Brilliant (*Ludwig*). Very thick, leathery light red with white deep in throat, occasional irregular white line on lip petal. 3 scapes 24″ with 4 six inch florets. Rating 1950—B. Mothers Day (*Ludwig*). Medium rose red deepening in throat to crimson red with white striping at base of petal. Irregular flecks of darker red to violet red appear in petals. 2—3 scapes 20″ tall with 3—4 six inch florets. Rating 1950—B. Orange King (*Warmenhoven*). Light red that loses its color as the florets age giving a blue gray sheen. 2—3 scapes 18″ tall with 4 eight inch florets. Rating 1950—B. Orange Wonder (*Ludwig*). Light red with light throat appearing dull pink. 3 scapes 18″ tall with 4 six inch florets. Rating 1950—B. Shakespeare (*Ludwig*). Glistening medium red blending to deeper red in throat, white line on some petals most prominent deep in throat. 3 scapes 18″ tall with 5—6 florets. Rating 1950—A.

DARK AND WINE RED: Lucifer *(Warmenhoven)*. Medium dark red of great substance. 2 scapes 19″ tall with 3 eight inch florets. Rating 1950—B. Moreno (*Warmenhoven*). Medium dark red with slight suffusion of rose red in the throat. 3 scapes 26″ tall with 4 eight inch florets. Rating 1950—AA. Mysterie (*Warmenhoven*). Rose red blending to deep red in throat. Midribs and tips of petals are rose. 2 scapes 20″ tall with 4 seven inch florets. Rating 1950—B. Red Master (*Warmenhoven*). Huge dark red of great substance with flat florets. 2 scapes 24″ tall with 2—3 eleven to twelve inch florets. Rating 1950—AA. De Graaff *dark reds*. Flat dark red with 2 scapes 24″ tall with 4 six to eight inch florets. Rating 1950—A.

WHITE: Casper Ludwig *(Ludwig)*. Pure white with yellow-green lines in throat. 3 to 4 scapes 16-20 inches tall with 4 five inch bloom. Rating 1950—B. Early White (*Ludwig*). Pure white with faint green tinge in throat, good substance, 3 scapes 22″ tall with 4 to 5 five and one half inch blooms. Rating 1950—A. Joan of Arc (*Warmenhoven*). Pure glistening white with green in throat. 2—3 scapes 24″ tall with 4 to 6 seven and one half inch blooms. Rating 1950—A. Leading Lady (*Warmenhoven*). Wide open pure white with green throat. 3 scapes 20″ tall with 3 to 4 seven inch blooms. Rating 1950—B. Mount Tacoma (*Warmenhoven*). Pure white with faint green tinge in throat. Petals are winged at base, 3 scapes 24″ tall, with seven inch blooms. Rating 1950—A. Queen of the Whites (*Warmenhoven*). Glistening, waxy pure white with faint tinge of green in throat, blooms flat with slight recurve at tip. Scapes 25″ tall with 4—5 nine inch blooms. Rating 1950—AA.

[Fig. 13, lower left.] SNOW QUEEN (*Ludwig*). Pure white with faint green tinge. 3 scapes 18" tall with 4 five and one half inch blooms. Rating 1950—B. WHITE GIANT (*Ludwig*). Pure, frosty white with green tinge in throat, 3 scapes 24" tall with 5 six inch blooms. Rating 1950—A. UNNAMED PURE WHITE SEEDLINGS (*Van Meeuwen-De Graaff Strain*). Pure frosty white with faint green tinge in throat, 2—3 scapes, 18—30 inches tall with 4 six inch blooms. Good substanced flowers that are very flat in form. Rating 1950—A. [Fig. 13, lower right, and Fig. 14, center.]

WHITE STRIPED: KING OF THE STRIPES (*Warmenhoven*). Frosty

Fig. 14. Valleevue *xAmaryllis* Trials—Collection of Warmenhoven and van Meeuwen clones. SUPERIORA WHITE (van Meeuwen-de Graaff) in center.

pale pink with two broad undefined lines of carmine shading to vermilion in throat on each petal. 3 scapes 24" tall with 3—4 five inch blooms. Rating 1950—A. STRIPED BEAUTY (*Warmenhoven*). Orange scarlet lines that cover a large part of the petal giving the appearance of a white border. 3 scapes 20" with 3—4 six inch blooms. Rating 1950—B. UNNAMED STRIPED SEEDLINGS (*De Graaff*). Rose red lines on pure white, received as B. 2 scapes 15" tall with 4 five inch blooms. Rating 1950—C.

NOTE.—Any hybridizer of *Amaryllis* who desires to have any named varieties rated and displayed in the Cleveland Flower Show may contact the writer in care of the Garden Center of Greater Cleveland, East Blvd. at Euclid, Cleveland 6, Ohio, for full particulars.

REGISTRATION OF NEW AMARYLLID CLONES

Registrars: Dr. J. B. S. Norton and Prof. W. R. Ballard

This information is published to avoid duplication of names, and to provide a space for recording brief descriptions of new Amaryllid clones. Names should be as short as possible—one word is sufficient. It is suggested that in no case should more than two words be used. *The descriptions must be prepared in the form as shown in the entries below, and must be typewritten and double-spaced.* The descriptive terms used should be in harmony with those given in the "Descriptive Catalog of Hemerocallis Clones, 1893-1948" by Norton, Stuntz and Ballard.

There is close liaison between the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY regarding the registration of new *xHemerocallis* clones. By cooperative arrangement with the HEMEROCALLIS SOCIETY, beginning with the 1951 HERBERTIA edition, descriptions of only such *xHemerocallis* clones for which the 50c registration fee has been paid to Registrar, Mr. Earl A. Holl, 3520 North Grant Ave., Indianapolis 18, Ind., will be registered, and numbered (example: 3322-R). The number "3322" indicating the number of the clone and the "R," the information that it is registered. The registration fee is required *only* in the case of *xHemerocallis* clones, and *not* for other amaryllids which are registered free of charge by the AMERICAN PLANT LIFE SOCIETY.

Correspondence regarding new amaryllid clones, including *Hemerocallis*, to appear in HERBERTIA should be addressed to Prof. J. B. S. Norton, 4922 40th Place, Hyattsville, Maryland, *enclosing self-addressed, stamped envelope, if reply is expected.*

For obvious reasons, there is a limit to the number of descriptions included from any one member in any one issue. Not more than six brief descriptions of clones under each generic heading will be published from any one member in any one issue of HERBERTIA. Descriptions of clones in excess of six brief descriptions, up to a total of 25, will be entered if the space required for each is limited to one line. In this case use should be made of the standard abbreviations already mentioned.

HYBRID AMARYLLIS CLONE

Introduced by Dr. & Mrs. J. S. B. Norton, Hyattsville, Md.

NARCISSA. Reginae Type B. Shows *Amaryllis pardina* parentage; 2-flowered; perigone 8" across; tepalsegs $1\frac{5}{8}$" to $2\frac{3}{8}$" wide; general coloe aspect medium red (M&P 42-L-1), minutely veined and dotted with darker red; stamens purplish; stigma trifid.

HYBRID HEMEROCALLIS CLONES

TRIAL GARDENS. Cooperative daylily trial gardens have been established at (1) *Cornell University, Dept. of Floriculture, Ithaca, N. Y.;* (2) *University of Florida, Dept. of Horticulture, Gainesville, Fla.* (3) *Southwestern Louisiana Institute, Dept. of Horticulture, La-*

fayette, La.; (4) *Whitnall Park Arboretum, Milwaukee City and County Park Board, Milwaukee, Wisc.*; (5) *Texas A. & M. College, Dept. of Horticulture, College Station, Texas*; (6) *Des Moines Park Board, Des Moines, Iowa.* [Complete addresses are given under *Officers and Committees, below.*]

Introducers should send complete collection of hybrids to these cooperating agencies in order that the new daylily clones may be impartially evaluated.

Introduced by Robert Schreiner, Salem, Oregon.

KIM, scape 38 inches; late mid-season; flower dark orange red. (3051)

Introduced by Mrs. Thomas J. Nesmith, Lowell, Mass.

BEATRICE, scape 39 inches; mid-season; flower deep cardinal red; semi-deciduous. (3052)

DANTE, scape 38 inches; mid-season; dahlia purple; semi-deciduous. (3053)

Introduced by H. M. Russell, Spring, Texas.

BLUE MIST, scape 3 feet; mid-season; wide segments ocean blue, deep purple eye zone; extended bloom; deciduous. (3054)

PEARL SHERWOOD, scape 4 feet; mid-season; wide segments pale greenish lemon; extended bloom; deciduous. (3055)

Introduced by R. W. Wheeler, Winter Park, Fla.

LILAC TIME, scape 40 inches; early mid-season, remontant; light yellow and polychrome. (3064)

WATERMARK, scape 24 inches; early, remontant; flower light red and light yellow bicolor. (3065)

Two typographical errors occur in Mr. Wheeler's registrations in Plant Life, 1949, page 90:—MERCEUSE should be BERCEUSE, and TOMAKA should be TOMOKA.

Introduced by Stanley E. Saxton, Saratoga Springs, N. Y.

BRIDESMAID, Scape 42 inches; mid-season; light red. (3056)

ESCORT, scape 45 inches; mid-season; light red. (3057)

EVALINA, scape 36 inches; mid-season; light yellow with halo. (3058)

FIRST PROM, scape 24 inches; mid-season; light red and light orange red bicolor with halo. (3059)

JACK-O'-LANTERN, scape 36 inches; early mid-season; orange red. (3060)

JUNE MOON, scape 32 inches; early mid-season; light red orange and light yellow bicolor. (3061)

LIBERTY BELL, scape 42 inches; early mid-season, remontant; dark orange. (3062)

TROPHY, scape 36 inches; early mid-season; light orange yellow with spot. (3063)

CORRIGENDA. Descriptive Catalogue of Hemerocallis Clones, 1893-1948, by Norton, Stuntz and Ballard. 1949.

The following corrections are here made in addition to those in PLANT LIFE 5:90, 133. The clones for which changes are to be made are

listed under their registration numbers or their names.

113, for "source unknown" read "Lester."
BRILLIANT, for "230" read "238."
330, see CHALICEA, page 85.
COVENT GARDEN, for "483" read "482."
FLAMANTE, for "739" read "738."
GLAMOUR, for "867" read "857."
GLORIANNA, add "(863)."
APOGEE, page 84, for "1045." read "1043."
1064, for "2704" in 1949 PLANT LIFE, page 89, read "1064."
nana, page 59, omit the number, "1506."
1533, for "MICKAJACK" read NICKAJACK."
RED DOT, for "1834" read "1398."
ROYAL LADY, for "1947" read "1944."
SATSUMA, for "2023" read "2029."
2320, for "TOREADOR" read "RUSSELL TOREADOR."
2344, for "ony" read "only."
VARIEGATED KWANSO, add "(1506)."
ONEONTA, page 87, for "2583" read "2582,"

AMARYLLID GENERA AND SPECIES

HAROLD N. MOLDENKE

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to the readers.]

Demeusea De Wildeman & Durand, Bull. Soc. Bot Belg. 39: 77-79. 1900.—Perianth straight, erect, the tube cylindric, very short, the lobes shorter, narrow, equal; stamens equally attached in the throat, equaling the lobes, not longer; filaments filiform; anthers small, oblong, dorsally attached, straight; ovary 3-celled; style filiform; stigma entire; ovules solitary; rhizome thick, compact; leaves few, elongate, lorate; scape slender, articulate at the base; flowers umbellate, the pedicels slender, short; involucreal bracts indefinite, numerous, the interiors ones linear.

Demeusea longifolia De Wild. & Th. Dur. op. cit. 78-79. Rhizome thick, solid, about 12 mm. wide, brown on the outside, the roots numerous, densely pilose; leaves ending in a long petiole which is dilated at the base, reaching 40 cm. in length and 20 mm. in width, the leaves being acute, loriform, glabrous on both surfaces, with about 8 veins on each side, more or less crisped along the margin; scape central, pedunculate, 5 cm. long, increasing after anthesis to 20 cm. in length; umbel many-flowered, 2—3 cm. wide, bracteate, the exterior bracts 4, ovate-elliptic, the 2 larger ones about 14 mm. long and 8 mm. wide ,the 2 smaller ones 10—12 mm. long but 3—4 mm. wide, the interior ones filiform; pedicels about 7 mm. long, after enthesis reaching 20 mm.; the perianth articulate at the base, the tube cylindric, very short, about 0.8 mm. long, the seg-

ments linear-elliptic, subobtuse, 4.5—5.5 mm. long and 0.6 mm. wide, 3-nerved; filaments slender, about 2 mm. long; anthers yellow (?), about 2.5 mm. long; fruit unknown. Congo, without definite locality indicated, 1891 (F. Demeuse).

Zephyranthes melanopotamica Speg., Anal. Mus. Buenos Aires, ser. 2, 7: 169. 1902.—*Euzephyranthes:* the bulb ovoid, moderately large, dark-tunicate; leaves narrowly linear, very long, green, not synanthous; scape erect, more or less elongate, terete, glabrous; spathe elongate, bifid, more or less long-connate below the middle, becoming whitish; flowers solitary or paired, erect, borne on pedicels that are shorter than the spathe; periamth turbinate, moderately large, its segments oblanceolate, rather acute, white, twice as long as the unequally long glabrous stamens, shortly tubular-subconnate at the base, the scales small, pectinate-ciliate; the style rather long but included, trifid at the apex. It grows in dunes along the Rio Negro, February 1898 (C. S.)

The species is closely related to *Z. mesochloa* Herb., from which it differs in its non-synanthous and in its interstaminal scales being extremely ciliate-pectinate. The bulbs are ovoid, 30—35 mm. long, 20—25 mm. in diameter, often very deeply buried, clothed with many dark tunics, with an elongate neck, 10—30 cm. long, 1 cm. in diameter; leaves 2—5 from each bulb, erect, glabrous, 20—30 cm. long, 3 mm. wide, soon evanescent; scape becoming purplish downwards, green upwards, fistulose, 7—25 cm. long, 3—5 mm. in diameter; spathe acrogenous, solitary, membranous, subhyaline-whitish, 3.5—5.5 cm. long, its base more or less short-tubular, 5—20 mm. long, 6—7 mm. in diameter, the segments erect, narrow, acute; flowers inodorous, erect, the pedicels always (even after anthesis) short, 25—35 mm. long, 1.5 mm. thick, often becoming purplish, glabrous, terete; perigonium 4—5 cm. long, its base rather long obconic-tubular, 15—20 mm. long, more or less expanded above to 30—40 mm. in diameter, its segments oblanceolate, 8—10 mm. in diameter, more or less acutish toward the apex, gradually narrowed toward the base and subconnate into the tubular part of the perigonium, very lightly 11—13-nerved, white, reddish toward the base but the claw and the midrib greenish; interstaminal scales opposite the petals and adnate with them near the base, free for a short distance, white-greenish, pectinate-ciliate; stamens erect, the 3 longer ones 25 mm. long, the 3 shorter ones 18 mm. long; filaments slender, glabrous, free, lightly reddish, inserted toward the base of the perigonium; anthers versatile, rather large, 7 mm. long, 1 mm. thick, subundulate, yellow; ovary elliptic-globose, 7—10 mm. long, 5—7 mm. in diameter, slightly purplish, glabrous, rather obtuse at both ends; style erect, 30—35 mm. long, slender, glabrous, terete, crowned at the apex with 3 stigmas which are rather broad, subcircinate, suberistate, 3—4 mm. long, and 1 mm. wide; capsule subtridymous-globose, 10—12 mm. in diameter and length, thin-membranous, loculicidal, glabrous, becoming purplish; seeds irregularly suborbicular, 4—5 mm. in diameter, lightly subfoliaceous, flaccid, black, rather shiny.

Zephyranthes traubii (Hayward) Moldenke, **comb nov.**; syn.—*Cooperia traubii* Hayward, in Herbertia *3*: 64. 1936.

Zephyranthes timida Holmb., Anal. Mus. Buenos Aires, ser. 3, 2:

77. 1903.—Roots thick, fibrous (about 8), gradually attenuate, to 9 or 10 cm. long; bulb oblong-ovate, 2.5 cm. long, 1.25 cm. in diameter, the tunics dark, the neck 1.5 cm. long and 3.5 mm. in diameter; leaves quite green, 3, caniliculate above, convex beneath, slightly keeled, 13 cm. long, 2 mm. wide, rather obtuse; scape precocious, compressed, 14 cm. long, attenuate from the base upwards, at the mid-point 3.25 x 2.5 mm. in diameter, green, becoming whitish at the base; spathe 3.5 cm. long, closed at the base (almost for the basal half), from there upwards unilaterally opened, the segments later bifid, albescent-sordid, marked with small rose-colored dots or small lines; pedicels 3.5 cm. long, 1.75 mm. in diameter, pale-green; ovary quite green or *Lagenaria*-green, 5 mm. long, at the base 2.5 mm. and at the apex 2 mm. in diameter; perianth with its tube very short, the segments acutely lanceolate-oblong, the exterior ones 40 mm. and the interior ones 38 mm. long, all 6 mm. wide, inside white, doubtfully reddish, outside with a pale-rose band (the color produced by the scattered or besprinkled little lines and dots), with 5 pale-green lines or veins running up and down from the middle, and yellowish-green in the lower third, with the margin of the segments finally white, almost 1 mm. wide; the filaments greenish, the smaller ones 12 mm., the larger ones 16 mm. long; the anthers retrorsely arcuate, that is, recurved, 4 mm. long, about 0.5 mm. wide; the pollen golden-yellow; the style pale-green, 17 mm. long, trifid, the segments 4—5 mm. long. A single flowering specimen I have seen in the Botanical Garden at Buenos Aires and sent to me very kindly by the illustrious Director Carolus Thays 2 days before the Ides of March [= March 13, H.N.M.]. The remaining specimens (not yet in flower) and the type collected by Rev. A. de Llamas at Santa Ana, Misiones.

Crinum uniflorum Sessé et Monciño, Fl. Mex. ed. 2. p. 88. 1894. The *Crinum* with a 1-flowered spathe, linear leaves, H. N. illustration. Root-bulb scaly, subrotund, covered with filiform fibers toward the base; stem-scape 23 cm. tall, terete-subcompressed, 1-flowered; leaves linear, entire, almost channeled, longer than the scape, erect; spathe united into one structure (monophyllous), membranous, striate, splitting longitudinally at the side; corolla gamopetalous, funnel-form, the tube obtusely triangular, the limb 6-parted, the divisions obovate, spreading, the exterior ones very slightly longer, mucronate, the mucro incurved; stamens-filaments 6, subulate, inserted at the mouth of the tube, half as long as the limb, erect, anthers linear, versatile; pistil-ovary inferior, obtusely 3-sided; style filiform, as long as the stamens; stigma trifid, the divisions obtuse, spreading-reflexed; pericarp-capsule subrotund, obtusely 3-sided, 3-celled, 3-valved, splitting at the apex; seeds very many, subovate, bifariously incumbent.

It grows in the gardens of St. Augustine, where it is called commonly "quiebra platos." It blooms in May. It varies in having white and rose flowers. Properties—the root is almost sweet and mucilaginous.

Amaryllis propinqua Salisb., Prod. Stirpium, etc. p. 230. 1796. The *Amaryllis* with the leaves broadly linear-lanceolate, eremulate, glabrous; peduncle 4—7-flowered, compressed; tube of the corolla 10 cm. long, the

divisions recurved, linear-lanceolate, almost equal; filaments incurved-spreading.

The *Crinum* with leaves, etc., of Philip Miller, Ic. p. 73, pl. 110. The Lilio-asphodelus Americanus, etc., of Commelyn Pl. Rar. p. 15, pl. 15.

Robert Millar collected it growing spontaneously near Panama. Very closely related to . . . . . [*A. procera* Salish.] but differs in its lower stature, proportion, and the remarkable aspect of the herb, the leaves in this being more luxuriant green, more glabrous, not recurved as in the manner of that one.

Amaryllis capensis? Sessé et Monciño, Fl. Mex. ed. 2. p. 86. 1894. The *Amaryllis* with the spathe 1-flowered, the corolla equal, the pistil declined. Hort. Cliff. 135, pl. H.

It grows in gullies in the neighborhood of Guadalajara. Corollas red-purplish. *Amaryllis* with a many-flowered spathe; corollas campanulate, equal; genitalia declined; scape compressed, the same length as the umbel. Roy. Lugd. 72, 36; Ehret. pictum pl. 13.

The African lily that is low, with very long leaves, many-flowered, deep purplish. Herm. Parad. 190, pl. 195.

It grows in Aethiopa and is cultivated for ornament in bouquets at Guadalajara, Mexico, where it is called "flor de Lis." Herbaceous. Flowers 3 to 6, deep scarlet, issuing from a single spathe in the month of April.

Amaryllis Regina (sic) Sessé et Monciño, Fl. Mex. ed. 2. p. 86. 1894. The *Amaryllis* with many-flowered spathe, corollas equal, petals undulate, stamens declined, Fl. Mex. Scape terete, inflated at the center; spathe about 7-flowered; petals "dark-white" [dirty?], 3 red. It grows in Mexico. It blooms all spring.

Crinum americanum Sessé et Monciño, Fl. Mex. ed. 2. pp. 87—88. 1894. The *Crinum* with the apexes of the corollas inwardly hooked; scape lateral, flexuous, compressed, smooth, almost 91 cm. long; leaves 1½ "lengths of the forearm" long, ensiform, thick, very smooth, channeled, sessile, membranous and denticulate along the margin; umbels terminal, simple, about 6-flowered; flowers sessile, large, elegant, the tube 17.8 cm. long, or longer, obsoletely 3-sided, the divisions white within, almost violet outside, alternate, hooked inwardly; stamens divergent; filaments blood-red; pistil concolorous; bracts at the base of the individual flowers, binary, linear, membranaceous, shorter than the tube.

It grows at Cordoba; flowers in July; perennial.

Zephyranthes Andersonii (Herb.) Baker; Holmb., Anal. Mus. Buenos Aires, ser. 3, 2: 78—79. 1903.—I have examined some specimens collected by me in the first days of May, 1902, in the mountains and fields in Tandil. The first bloomed 4 days before the Ides of November, 1902 [= November 9, H.N.M.]; the rest at various times: December (1902), January, February, March (1903).

Five varieties are thus far known: (a) *aurea* Herb., Bot. Reg. pl. 1345a; (b) *cuprea* Herb., op. cit., pl. 1345b; (c) *obscura* Herb., loc. cit. (the bud very black on the outside); (d) *brevilimbus* Herb., loc. cit.

(with the leaves broader); (e) *parvula* Herb., Amaryll. pl. 26, fig. 4. A new one to be added is (f) *rosea* Holmb. [p. 79], var. nov.—part of the perianth yellow or golden, the remainder rose (Tandil, vol. 10, p. 902. H.). It flowered in the Zoological Garden in February 1903.

Zephyranthes gracilifolia (Herb.) Baker; Holm., Anal. Mus. Buenos Aires, ser. 3, 2: 78. 1903.—I actually collected very many specimens of this species in the first days of May, 1902, in fields and mountains of Tandil in the province of Buenos Aires.—(a) Conforming with the description, bloomed in the Zoological Garden in the months of February and March, 1903. (b) *Brothiana* Herb., Amaryll. 105; Bot. Reg. pl. 1967. not seen. (c) *Bulala Holmb.*, var. nov.—the perianth white, without red or rose, which is lacking also in the scape (H. Z., fl. 2, 1903). (d) *Bijou* Holmb., var. nov.—more robust in all parts and the scape longer; perianth white, the segments pale-rose on the ouside on their apical half; scape without rufescent color. (H.Z. fl. 2. 1903).

Zephyranthes oxitepala Speg., Physis 2: 41. 1917.—Euzephyranthes, synantherous, the scape rather elongate, 1-flowered, the spathe bifid laterally sometimes to the base, sometimes only to the middle, the flower erect, borne on a somewhat shorter pedicel, the tepals greenish, white above, narrow, acute, rather rigid, very shortly connate toward the base, scales and [thickenings?] distinctly none, the stamens shortly coalescent at the base, the 3 outer one-third, the 3 inner one-half as long as the tepals, flavescent; the anthers horseshoe-shaped, yellow; the style quite long—surpassing the stamens, trifid at the apex; the stigmas rather elongate, whitish, revolute. Argentina. Common after rains in meadows, Campina de Amerigo and Campina de San Pedro, Misiones, March 1907.

Haemanthus (*Melicho*) *Nelsonii* Baker, Kew Bull. Misc. Inf. 310. 1898.—It differs from the rest of the species in this subgenus by its large membranous leaves and long-exserted genitals.

Bulb oblong, compressed, 2 inches in diameter, the tunics thick, double, pink; leaves synanthous, sessile, oblong, membranous, a foot long, 4 inches wide at the middle, with soft scattered hairs on the front, the black glabrous; peduncle a foot long, pilose; umbel many-flowered, globose, 3 inches in diameter; pedicels 10—12 mm. long; bracts small, linear, reflexed; perianth scarlet, the tube cylindric, 6 mm. long, the segments linear, twice as long as the tube, the expanded flower spreading-erect; stamens long-exserted. Transvaal.

Eustephiopsis R. E. Fries, Act. Soc. Upsal., ser. 4, 1 (1): 162. 1905. —Bulb tunicate, produced into a neck; inflorescence pseudo-umbellate, 2- to many-flowered; flowers stipitate; perigonium funnel-form, its tube very short or short-cylindric, the lobes erect-spreading, subequal; stamens inserted in the throat of the perigonium, subequal, included, erect; filaments winged from the base to ⅔ their length or longer, free at the base, connate into a ring at the apex; anthers linear-oblong, dorsifixed; ovary 3-celled; ovules very numerous, in 2 series; style filiform; stigma capitate or trifid. Argentina.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 6.]

3. GENETICS AND BREEDING

COLCHICINE-INDUCED **HEMEROCALLIS** POLYPLOIDS AND THEIR BREEDING BEHAVIOR

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I. INTRODUCTION

The first great advance in the development of the genus *Hemerocallis* L. as an ornamental garden plant began in the early 1890's with the production of hybrids by Yeld in England. More extensive breeding experiments have been continued since then in Europe and the United States (Stout, 1934; Norton et al, 1949). Although this approach to the problem of improving *Hemerocallis* is not as yet yielding diminishing returns, the progress might be greatly accelerated with the added tool of induced polyploidy as reported previously by Traub (1949) and in the present paper, particularly when combined with hybridization.

Stout (1932) made a survey which showed "... (1) that a somatic number of 22 chromosomes is the rule for all species of the genus, (2) that triploidy exists in several of the cultivated clones of fulvous daylilies, and (3) that diploids, triploids, aneuploids and para-triploids are to be obtained among the seedlings of diploids crossed with triploids." He recorded that "offspring have been obtained by crossing triploids with certain diploids, and chromosome counts have been made for 44 of these seedlings. The majority of these seedlings are diploids, a few are triploids, and several are aneuploids with numbers that are fluctuating for various numbers between the diploid and triploid." He concluded that "As long as the seedlings obtained have one parent which is diploid there is little chance of advancing to higher levels of polyploidy."

It is apparent that speciation in *Hemerocallis*, once the typical amaryllid diploid, $2n = 22$, was reached, under natural conditions, has been due to chromosome segmental rearrangement and/or gene mutation and not to polyploidy. If polyploidy could be brought in as an added factor, it is apparent that the evolutionary mechanism could be elaborated and this might speed up diversification. It was for this reason that experiments for inducing polyploidy in *Hemerocallis* were included in the larger program in 1940. These experiments were interrupted by war work but have been continued since 1945. Some interesting results have been obtained and part of these are reported in the present paper.

The main source of colchicine at present is *Colchicum autumnale* L. According to Blakeslee (1938), Levan (1938; 1940) and Levan & Steinegger (1947b), the roots of *Colchicum* species tested can grow in relatively concentrated colchicine solutions, up to 20% (Levan, 1940),

without any apparent poisoning effect. These workers used roots still attached to the plants. Cornman (1942), who used excised roots of *Colchicum* and the green flagellate, *Chlamydomonas*, which contains no colchicine, but shows resistance to colchicine poisoning, reported that "*Colchicum* . . . . . responds to high concentrations (up to 10%), with a typical colchicine effect. Accordingly, the immunity of *Colchicum* resides not in a difference in the mitotic process but in some extra-mitotic protective agency." The following compounds have been reported as antagonistic to colchicine: inositol (Chargaff et al, 1948; Cornman, in press, 1950); glucose (Cornman, in press, 1950), and cortical hormone (Tôrô, 1939; Lettre & Lettre, 1946). The following have been reported to synergize colchicine: NaF (Cornman, in press, 1950); chloroform (Levan & Steinegger, 1947a); and phenylurethan (Deysson, 1945). On the basis of the work quoted, Cornman (in press, 1950) concluded that these observations are compatible with the idea that cells can to some extent inactivate colchicine through a system which is inhibited by NaF, $CHCl_3$, or phenylurethan, or by mechanical interference with the source of nutrient, and is aided by glucose or cortical hormone.

Since Klein & Pollauf (1929) reported that colchicine had been demonstrated by micro-chemical analyses in *Hemerocallis fulva* L., it might be assumed that *Hemerocallis* species and hybrids would show immunity to colchicine poisoning, which causes induced polyploidy, according to the hypothesis of Blakeslee (1938) Levan (1938, 1940), and Levan & Steinegger (1947b). However, Traub (1949) reported on the basis of his experiments that *Hemerocallis* species and hybrids are very sensitive to colchicine, and concentrations in aqueous solution tested in the range from .025% to .1% with appropriate application techniques are quite effective in inducing polyploidy, and that concentrations much above .1% usually lead to the eventual death of the treated plants. If Klein & Pollauf's results as to colchicine content of *Hemerocallis* can be verified, then it would appear that this would be a case where a plant containing a relatively small amount of colchicine would be subject to colchicine poisoning on application of relatively greater amounts in harmony with the hypothesis of Cornman (1942). Only further experimentation can settle this question conclusively. However, the experiments as previously reported by Traub (1949) and in the present paper do show for all practical purposes that colchicine may be used as an effective mutagen to induce polyploidy in *Hemerocallis*.

II. PLANT MATERIALS AND METHODS

Plant Materials

The monocotyledonous genus *Hemerocallis* L. is restricted to herbaceous perennial species. The plants—seedlings or clones maintained under culture—increase by the production of multiple underground shoots, which are reduced stems or pseudo-bulbs sheathed by the basal leaf parts (Traub, 1936c). The shoots usually are formed in a compact group or crown (clump) of numerous more or less interwoven underground branches. In some cases, namely, *H. fulva*, etc., the shoots may be sep-

arated by the formation of longer rhizomatous (underground) stems, thus making a more or less ramifying group.

Extensive induced polyploidy experiments with *Hemerocallis* have been carried on, including material of four types: (a) seeds, (b) small seedlings, (c) single stem ramets obtained by division of the clump, and (d) small ramets obtained by fractional stem cuttage (Traub, 1936b; 1936c). Only some of the results from the last-named type, which are important from a practical as well as the theoretical standpoint, are included in this brief paper. The other work will be reported later.

Ramets of *Hemerocallis* species, varieties, natural clones, and hybrids clones were propagated by means of the vertical stem cuttage method of Traub (1936b; 1936c). The single stem divisions were quartered vertically and were then sprouted in a propagation medium before treating with the mutagen. The purpose of this procedure was threefold: (a) to increase the number of ramets; (b) to reduce the size of the ramets so as to facilitate handling, and also to reduce possible interference from any colchicine-antagonistic agents in the tissues as set forth by Chargaff et al (1948) and Cornman (in press, 1950); and (c) to throw the material back into a relatively more juvenile developmental stage similar to younger seedlings so as to take advantage of the "grand period of growth" during treatment as will be explained under the following section. A number of species and 18 hybrid clones were included in the experiments but on account of space limitations only three typical numbered experiments, involving the clones MAYOR STARZYNSKI, BERWYN, ROSALIND, and E. W. YANDRE, will be reported, but incidental mention will be made of some other work.

Mutagens used and method of treatment

A number of mutagens were used in the experiments with *Hemerocallis* but none equalled colchicine in effectiveness and therefore only the results with this compound are included.

The *Hemerocallis* plant increases by the addition of shoots, each covered with the basal portions of the leaves that are non-meristematic as in the great majority of the *Amaryllidaceae*. The shoots are slightly below or close to the ground and they are effectively protected from external stimuli. This applies also to many other monocotyledons. The objective in these experiments was to supply the mutagen in aqueous solution through the roots to the histogenic layers (Dermen, 1945) and core in the shoot apex when the plant was in active growth. The concentration is regulated so as to cause effective polyploidy but not to give the plant such a severe set-back that it may not resume growth during the alternate recovery period as explained in the next paragraph. The effect of too severe treatment is shown in Fig. 15. This shows that when plants B and C were dried at room temperature for 48 hours, then soaked for 48 hours in .05% and .2% colchicine solutions respectively, both died before the end of six weeks after removal from the mutagenic solutions and culture in a complete nutrient solution. In contrast, the control #1 given the recommended treatment (Fig. 15-A) resumed growth and

control #2, plants dried for 48 hours and placed in a nutrient solution, survived.

The second requirement, as will be explained more in detail under the discussion, is that the mutation (polyploidy) be caused not once but repeatedly so that numerous sectors are polyploidized in the apical histogenic layers (Dermen, 1945) and core. In this way the chances of obtaining dominance of polyploid tissues in the shoot apex are increased. The objective can best be attained by keeping the plant in active growth.

Fig. 15. *Hemerocallis multiflora* Stout, showing effect of severity of treatment: A, (Control #1), given six 4-hour treatments with .05% colchicine alternated with the same number of 16-hour recovery periods as described in text; B & C, dried at room temperature for 48 hours, then soaked for 48 hours (B) in .05% colchicine, and (C) in .2% colchicine. Control 2, not shown in figure, dried as in B & C, but not treated, developed normally. All grown subsequently in complete nutrient solution for 6 weeks. Note that ramets B & C have died.

and giving it alternate treatments punctuated by relatively longer recovery periods in a complete nutrient solution, although culture in tap water may be adequate in some cases. Wellensiek (1947) reported pioneer work with a similar method with wheat-rye hybrids as the test objects.

The procedure which gave best results with *Hemerocallis* is as fol-

lows: In late October—November, single stem cuttings are further divided by quartering vertically (Traub, 1936b; 1936c), and these cuttings are placed in flats in a growing medium of ½ sand and ½ granulated peat moss. They are allowed to sprout and after a few months (in mid-Feb.-Apr.) when the plants are in active growth, the ramets are treated. They are taken up, washed free of soil, and treated with roots immersed in aqueous solution of .05% colchicine—several ramets in each beaker—for a number of 8-hour periods, from 7 a. m. to 3 p. m. alternated with 16-hour recovery periods in tap water, or a complete nutrient solution (Hoagland & Arnon, 1938), from 3 p. m. to 7 a. m. the next morning. When the change is made from one treatment to another the roots of the plants are washed in running tap water. The number of treatment periods was varied from 4 to 16, but the best results were obtained as a rule with 4 to 6 treatments.

New .05% colchicine solutions may be used for each treatment, but such a practice will prove to be very expensive. As an alternative, the solutions may be re-used over a fairly long period by adding water to make up for evaporation (determined by allowing an equal volume of solution with the same surface area to stand without plants for an equal time), but not for the moisture absorption by the plant, and filtering between changes to remove any accumulated debris. If the alternative method is followed, it should be realized that the amount of colchicine taken up by the plant is unknown at present. Thus the solution may remain approximately constant, or become concentrated or diluted with each re-use and addition of water, depending on whether the plant absorbs colchicine from the solution at a rate as great as, or greater or less than, that originally present. The optimum concentration in these experiments has been indicated as .05%, but the mutagen is effective in the range of .025% to 1%, without too great injury to the plant at the higher concentration. Therefore, if the re-use program is not carried to the extreme, it should give satisfactory results, as shown by the present experiments.

The treated plants and controls were grown as pot plants in the greenhouse. Previous experiments had demonstrated that *Hemerocallis* can be successfully maintained under such conditions in 6″ to 8″ pots, the size depending on the stature of the species or clone. In most cases the plants improved with age over a period of 2—3 years, after which they were repotted, a single shoot division in each pot. However, some, especially such rapidly multiplying clones as Berwyn, need yearly repotting. The treated and control plants were grown in a potting medium of 1/3 loam, 1/3 sand and 1/3 peat (granulated). A complete fertilizer was used at least every two months during the active growing season. In the case of some clones, cold storage during the resting season is beneficial.

Methods of establishing polyploidy

Polyploidy was established on the basis of pollen grain size, stomate size, and chromosome numbers as shown by pollen tube mitoses (n number) and root-tip mitoses (2n number).

Pollen storage. The pollens required for the determination of pollen grain size and n chromosome numbers in pollen tube mitoses were collected in No. 000 gelatin capsules and were used in the fresh condition or after storage. In the latter case, the pollens were stored at 3° to 5° C., in a refrigerator, in closed containers over a saturated solution of zinc chloride, which provides a relative humidity of approximately 10% (Traub, 1936a; Traub & O'Rork, 1937). Under these conditions *Hemerocallis* pollens may be stored for 6 months or more and remain viable as shown by germination of pollen grains on artificial media. These results are in harmony with the recent work of Johnson & Griffiths (1950), who have shown that *Hemerocallis* pollens, as measured by the percentage of capsules set, remained viable for at least 3 months, when stored at a temperature of 3° C. and a relative humidity of 10%.

Pollen grain size. As the first measure of polyploidy, the comparative size of pollen grains of controls and treated plants was determined. For this purpose pollen grains were fixed, stained and permanently mounted directly in either Zirkle's gelatin-sorbitol-ferric-aceto-carmine (1940) or in Traub's uranyl- or other arabinate-sorbitol-ferric-aceto-carmine direct permanent mountant (Traub, 1951a; 1951b).

Stomate size. As added evidence of the extent of polyploidy, the stomate size was determined by stripping the epidermis from the under side of the leaves and mounting it in the manner indicated in the preceding paragraph. It was very difficult to obtain sufficient translucency for good photomicrographs, but they are clear enough to serve the intended purpose.

Pollen tube mitoses—n chromosome numbers. This beautiful tool has unfortunately been little used, but deserves more attention. The permanency of polyploidy is dependent on the effectiveness with which the apical histogenic layers have been polyploidized, but it is not possible to determine this by means of root-tip mitoses until the plant has grown for a sufficiently long period so that roots are produced from tissues developed from initially polyploidized histogenic layers in the shoot apex. This requires at least two regular flowering seasons in *Hemerocallis*. The process might be speeded up by removing the older roots after the treated plants have been well established. In the meantime, it is possible to determine the n chromosome numbers in pollen tube mitoses as shown by La Cour & Faberge (1943) and Darlington & La Cour (1947). Stout & Chandler (1933) have shown that in *Hemerocallis* the pollen tube begins to protrude from the germinal aperture only a few minutes after the pollen is scattered on the germinating medium; approximately two hours later the generative nucleus passes into the tube, and at the end of four hours early and late prophases, metaphases and anaphases can be studied.

The method of germinating pollen grains on cellophane (non-moisture proof) for later staining and mounting in euparal as originally described by La Cour & Faberge (1943) did not give reproducible results under our laboratory conditions. It was not possible to float the cellophane squares on a large drop of the germinating medium as recommended. In most cases too much moisture came through, and the pollen

tubes were not securely fastened to the cellophane and so they came off during the subsequent hydrolyzing and staining operations. After many substitutes had been tried the following modified procedure proved fairly successful with *Hemerocallis* pollen.

The germinating medium was supplied to the pollen as follows: single or double 2 mm. by 2 mm. filter paper squares were placed in a small petri dish bottom, 5 cm. inside diam., and the papers were wetted with 3 or 4 drops of sugar solution (germinating medium). A cellophane square, 1.5 mm. by 1.5 mm. was wetted in the same medium, blotted on filter paper, and then placed on top of the larger paper square. The small petri dish bottom assembly was then placed in a larger petri dish bottom, 9 cm. inside diam., and small amounts of acenaphthene and drierite, each in a tiny container, 2 cm. inside diam., were placed alongside the small petri dish bottom, and the larger dish bottom was then covered. The preparation was then ready for dusting the pollen on the cellophane square. The small petri dish bottom containing the cellophane with germinating pollen may be lifted out for convenient inspection of the pollen tubes under the low power (x20 ocular, x 10 objective) of the microscope since the wetted filter paper is sufficiently translucent.

Stout & Susa (1929) reported excellent germination of *Hemerocallis* pollen on a medium of 1% agar with 10% to 15% sucrose. Stout & Chandler (1933) reported similar results with 3/4% agar and 10% to 15% sucrose. In the present experiments, a medium containing 14% sucrose and 1% dextrose, dissolved in a complete nutrient solution (Hoagland & Arnon, 1938), gave best results.

The recommendation to combine colchicine with the germination medium (Darlington & La Cour, 1947) for the purpose of accumulating metaphases, could not be followed because its use caused great overstaining of the cytoplasm that could not be corrected during differentiation with ethanol. However, the use of acenaphthene as indicated above had no apparent effect on the staining of the cytoplasm. Since acenaphthene is poisonous, due caution should be exercised by keeping it in closed containers when not in use.

The use of a small quantity of drierite in the closed chamber to reduce excess humidity during germination was found advantageous in experiments with *Hemerocallis* pollen which were completed at the end of 4 hours or earlier. When it was not used there was occasionally moisture accumulation on top of the cellophane, causing the same difficulty as too great permeability of the cellophane at high temperature. In the case of experiments carried out over longer periods, the drying may be too severe.

In the case of Hemerocallis pollen, it is important to regulate the temperature between 21° and 25° C. for best results with the cellophane method. Apparently, the permeability of non-moisture proof cellophane (composed of cellulose acetate and glycerine) was increased to such an extent at temperatures above 25° C. under the conditions of these experiments that too much germinating medium came through. The pollen tubes therefore did not adhere sufficiently to the cellophane and came

off during subsequent manipulations. At temperatures somewhat below 21° C., the growth of the pollen tubes was much retarded.

Various thicknesses of non-moisture proof cellophanes were tested, but Du Pont grade 300 PT, .0009-inch thickness (approximately .023 mm.) proved most effective in these experiments.

The pollen tubes were fixed after 3 to 4 hours' growth. The fixing, hydrolyzing and staining procedure was adapted from La Cour & Faberge (1943) and Darlington & La Cour (1947). The pollen tubes on the cellophane squares, after being fixed in 1-3 aceto-ethanol over night, were stained in leuco-basic fuchsin for 2—3 hours after 6-min. hydrolysis in 1 N HCl at 60° C. The cellophane squares with pollen tubes were then passed through ethanols—50%, 2 sec., 80% 2 min., absolute ethanol, 2 changes of 2 min. each—and mounted on the object slide in euparal. Some of these preparations are now over 4 years old and are still perfect.

Root-tip mitoses—2n chromosome numbers. During the second blooming season after treatment, it was possible to determine chromosome numbers by means of root-tip mitoses in roots developed from initially polyploidized histogenic layers in the shoot apex that had been subjected to colchicine poisoning. The procedure has been described elsewhere (Traub, 1951b; 1951c; 1951d): root-tips taken at 12 noon to 1 p. m. were pretreated for chromosome shortening for 2 to 2½ hours in a saturated solution of acenaphthene in .5% ethanol, killed and fixed in 1—3 aceto ethanol over night; and stored in 70% ethanol. The root-tips were treated in 1 N HCl at 65° C. for 2—5 minutes, in 45% acetic acid for 2—5 minutes, and washed for 15 minutes to 1 hour in water before staining for 1—3 hours in Traub's bismuth arabinate-sorbitol-ferric-aceto-carmine (Traub, 1951b; 1951c; 1951d). They were then mounted permanently in the same mountant.

Photomicrographs. Photomicrographs of *Hemerocallis* n and 2n chromosome complements were made by means of the inexpensive Leitz Micam camera in combination with a Bausch & Lomb research microscope. When root-tip cells (2n = 22, 33, 42 and 44) were flattened in the slide preparations by pressure according to the method of Traub (1951b; 1951d), it was possible to obtain photomicrographs with good detail by using the x20 ocular in combination with the x90 oil immersion objective. In the case of pollen tube mitoses mounted in euparal (La Cour & Faberge, 1943) fair detail was shown as a rule by the same combination for mitoses with n = 11 because the chromosomes were usually somewhat spread out. This was not the case, however, with n = 22 or polyploidized mitoses because the chromosomes were arranged in too great depth for focusing on a large percentage of those present.

III. PRESENTATION OF DATA

The results from typical experiments with colchicine-treated ramets of *Hemerocallis* clones—Mayor Starzynski, Rosalind and E. W. Yandre in this case—and their breeding behavior are summarized in Tables 1 and 2. Additional results with treated ramets of these clones and also the clone Berwyn will be included in the text presentation.

The development of the treated plants as compared with controls was relatively slower during the first 6 or 8 months after treatment. After that there appeared to be no great time lag with respect to time of flowering. For instance, in the case of Mayor Starzynski ramets treated in February, one control and one treated ramet bloomed in the following September, and all plants bloomed in March-April of the following year. Thus the first real opportunity of testing the treated plants presented itself 1-1/4 years after treatment, and the second testing took place 2-1/4 years after treatment. This report is being made 2-3/4 years after treatment in the cases of the clones Mayor Starzynski and Berwyn, and 1-1/4 years after treatment for Rosalind and E. W. Yandre.

The marked changes in the gross morphology of the treated plants as shown in Figs. 16 and 17, and Plates 13 and 15, are not in themselves sufficient proof of the exact genetic quantitative changes induced in the plants on the basis of increased chromosome numbers, but they offer a starting point for singling out plants that merit particular study on the basis of the recognized criteria for polyploidy. As already indicated, these concern the relative size of leaf stomates (Fig. 18), pollen grains (Plate 16 and Figs. 19 and 20), the n chromosome number determined by means of pollen tube mitoses (Fig. 21) and the 2n chromosome number in root-tip mitoses (Plate 17).

In order to avoid confusion in referring to the various polyploid types induced by colchicine treatments, it is necessary to adopt a simple broad classification with terminology. It is apparent that such a classification may be approached from different viewpoints, but in experimental work of this kind, the logical way is to proceed from the diploids (1A, see below), and colchicine-induced complete polyploids (2A), particularly the induced unitary complete polyploids (2B), to the more complex mixtures of tissues of different genetic constitution, or chimeras—complete polyploid chimeras (2C), and diplo-polyploid chimeras (3A). The diplo-unitary polyploid chimeras (3B), particularly of the diplo-tetraploid type, were most often encountered. This is apparently due to the optimal treatments with colchicine.

The conditions under 2C and 3A (and subdivisions) may be further subdivided. They may, for instance, be indicated on the basis of (a) mericlinal chimeras (discontinuous sectors of different genetic constitution—ploidy in this case) and (b) periclinal chimeras (tissues of one ploidy completely encircling the other). A subdivision of the mericlinal chimeric type was often met with in these experiments. In this variation, the plant was diploid on one side and diplo-polyploid or com-

pletely polyploid on the opposite side. This type is indicated as duoclinal in the text.

Classification and Terminology with symbols

1A. All tissues diploid (controls), 2x*	(1A) diploids
2A. All tissues polyploidized	(2A) complete polyploids
2B. Tissues of the same degree of polyploidy, 4x; 8x; 16x; etc	(2B) unitary complete polyploids
2C. Tissues of two or more degrees of polyploidy, 4x + 8x; 4x + 16x + 36x, etc.	(2C) complete polyploid chimeras
3A. Tissues partly diploid and partly polyploid	(3A) diplo-polyploid chimeras
3B. Tissues partly diploid and partly of the same degree of polyploidy, — 2x + 8x; 2x + 16x, etc.	(3B) diplo-unitary polyploid chimeras
3C. Tissues partly diploid and partly of two or more degrees of polyploidy, — 2x + 8x + 16x, etc.	(3C) diplo - multiple polyploid chimeras

*In this paper the definitions and symbols as given by Knight (1948) are followed, x denoting the basic number of chromosomes in a polyploid series; n and 2n referring to the gametic and somatic (zygotic) chromosome numbers respectively.

Clone Mayor Starzynski

From a total of ten colchicine-treated ramets of the clone Mayor Starzynski, one completely tetraploid plant (2B), Tetra Starzynski (Traub, 1949), the first reported tetraploid in the genus, was obtained. On the basis of stomate size and pollen grain size, it was possible to place the remaining treated plants in the broad classification of diplo-polyploid chimeras (3A) and to note that the diploid sectors are gradually gaining over the polyploid sectors so that during the second year the polyploid character had mostly disappeared. Eventually most of these may revert fully to the diploid state.

The complete tetraploid, Tetra Starzynski (the type of the synthetic tetraploid species, *Hemerocallis washingtonia* Traub, *sp. nov.*, described at the end of section IV), and one meriolinal diplo-tetraploid chimera of the duoclinal type, will be considered in detail, including the breeding behavior.

Complete colchicine-induced tetraploid. The tetraploid, Tetra

STARZYNSKI, represents 10% of the total of 10 treated plants. In this case apparently a sufficiently large proportion of the cells in the histogenic layers and core of the shoot apex were tetraploidized so that this portion assumed dominance over the remaining diploid portion. Such a

Fig. 16. A, Colchicine-induced tetraploid *Hemerocallis* TETRA STARZYNSKI, 2n = 44 (type of the synthetic tetraploid species, *Hemerocallis washingtonia* Traub, *sp. nov.*, described at end of section IV); and B control, MAYOR STARZYNSKI, 2n = 22, not treated. Grown in 7-inch pots.

result is of course very rare and difficult to achieve in material such as *Hemerocallis* by any method as yet reported. The percentage in this case is therefore unusual. In other experiments the percentage of complete polyploidy was usually nil, *but all of the treated plants were diplo-polyploid chimeras.*

The complete tetraploidy in this plant was established at the end

xHemerocallis: A, clone Mayor Starzynski, 2n = 22 (control); and B, colchicine-induced complete tetraploid, Terra Starzynski, 2n = 44.

Plate 13

of 1-1/4 years on the basis of significantly larger pollen grains (Plate 16-B), larger stomates (Fig. 18-B) and doubled chromosome complement, n = 22 in pollen tube mitoses (Fig. 21-B). At the end of 2-1/4 years, when roots were formed from tissues developed from initially tetraploidized histogenic layers in the shoot apex, it was possible to demonstrate complete tetraploidy also on the basis of root-tip mitoses, 2n = 44 (Plate 17-B).

This colchicine-induced tetraploid has now been maintained as a clone for over 2-3/4 years and has been divided into twelve ramets. It is

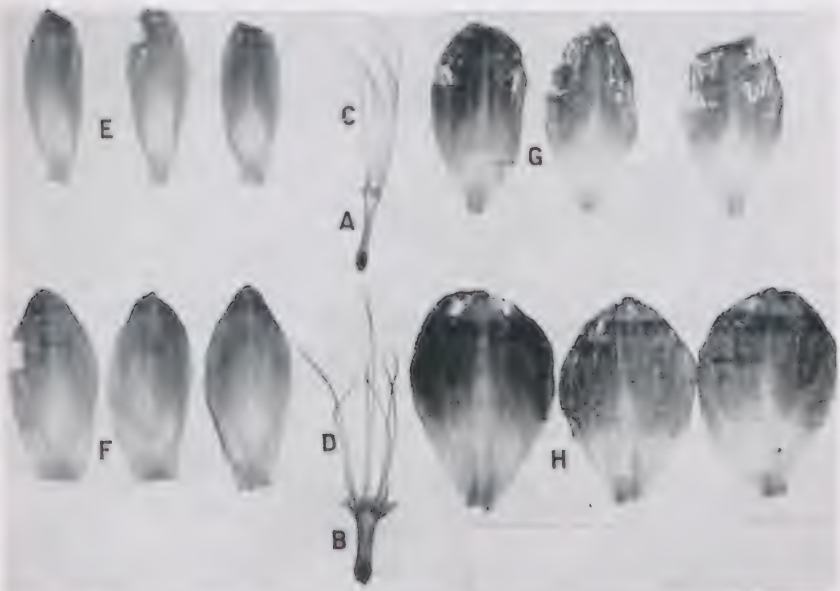


Fig. 17. Reproduction of herbarium specimens showing relative size of floral parts: upper row—*xHemerocallis* clone MAYOR STARZYNSKI, 2n = 22, control, A, tepaltube, C, filaments and style, E, sepsegs, G, petsegs; lower row—colchicine-induced complete tetraploid TETRA STARZYNSKI, 2n = 44, B, tepaltube, D, filaments and style, F, sepsegs, H, petsegs. Approx. .36 natural size.

self-fertile. As a rule only a limited number of seeds are produced per capsule, usually 3 to 8, rarely more. It is difficult to get a seed set until after about 2/3 of the flowers on the scape have been produced. The final flowers usually set seeds regularly when self-pollinated. It may be that the seed set can be increased by the application of growth hormone, but such trials are reserved for the future. The seeds are considerably larger than those produced by self-pollination of the controls. From 30% to 100%, an average of 55%, of the seeds obtained by self pollination of the tetraploid germinate. To date more than 25 seedlings have been obtained from such seeds, and two of these have flowered.

The gross morphology of the colchicine-induced tetraploid, TETRA

STARZYNSKI, is shown in Figs. 16 and 17, and Plate 13. It is interesting to note that tetraploidy in this case is characterized by the following phenotypic manifestations as contrasted with the diploid control: The plant (Fig. 16-A) is about as tall as the control, the leaves are somewhat wider, darker green, and thicker, the scape is thicker and has thicker branchlets, the tepaltube is thicker and shorter, the sepsegs and petsegs are thicker and wider, and the filaments and style are thicker (Fig. 17-B-D-F-H). The fragrance is slightly deeper, the flower texture is thicker, and the flower color is much brighter. However, the duration of the single opened flower is not lengthened. The flower opens slightly on

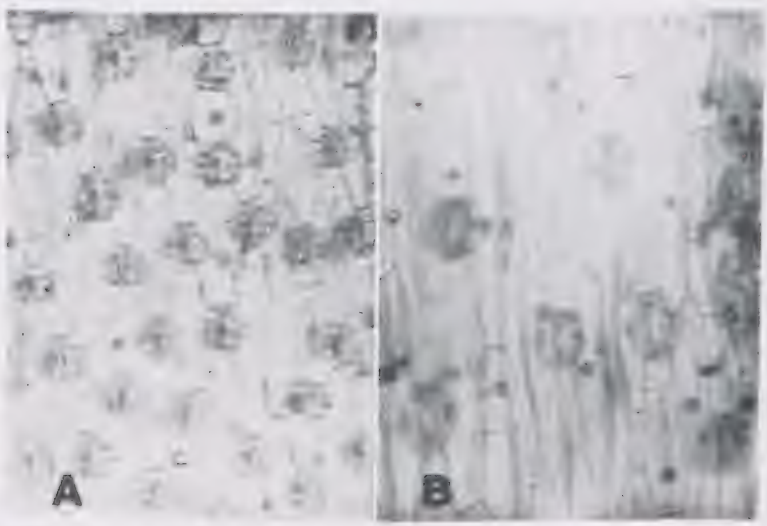


Fig. 18. Stomates of *xHemerocallis*: A, clone MAYOR STARZYNSKI, 2n = 22 (control); B, colchicine-induced complete tetraploid, TETRA STARZYNSKI, 2n = 44. Mounted in Zirkle's gelatine-sorbitol-ferric-aceto-carmine (Zirkle, 1940). x20x20.

the day before it fully opens showing the protruding style (Plate 13-B). On the following morning, the flower opens fully and fades at the end of the day. The flower duration in the F-1 progeny of TETRA STARZYNSKI is similar but as a rule the style does not protrude on the day before the flower fully opens.

F-1 progeny of Tetra Starzynski. As indicated above, up to the present more than 25 seedlings have been obtained by self-pollinating TETRA STARZYNSKI. About half of these have been examined cytologically, and in all cases the root-tip mitoses showed tetraploidy. Two of these, TETRA PEACH, 2n = 44 (Plate 17-E), and TETRA APRICOT, 2n = 44 (Plate 17-D), have flowered. The gross morphology of these, including flowers, is similar to that of the parent, but they differ particularly with regard to flower color as shown in Table 1. TETRA PEACH is near to peach-colored, and TETRA APRICOT is a very soft rich apricot. Both, in common with the parent, are outstandingly beautiful and of real horticultural merit.

Tetra Apricot x Tetra Starzynski. This cross gave progeny that are also tetraploids (Plate 17-G), but none of these have yet flowered.

Tetra Starzynski x various diploids. Some of these attempts were successful, giving rise to triploids, but others proved to be sterile. The cross TETRA STARZYNSKI (2n = 44) ♀ x STEPHEN FOSTER (2n = 22) ♂ was sterile, but the reverse cross gave rise to triploids, 2n = 33/2 (Plate 17-I). The cross TETRA STARZYNSKI (2n = 44) ♀ x IOWA (2n = 22) ♂ produced triploids as indicated in Table 2, and the reverse cross was sterile.

Diplo-unitary-polyploid chimeras. The diplo-unitary-polyploid chimeras (3B) obtained by colchicine treatment were of two general subclasses as shown by stomate and pollen grain size: (a) mericlinal chimeras which were diploid on one side and polyploid on the opposite side, or duoclinal, and (b) mericlinal chimeras with more than two discontinuous diploid and polyploid sectors.

Table 1. Comparison of colchicine-induced tetraploid *Hemerocallis* clone and segregates with the control clone, Mayor Starzynski.

Clone of segregate	tapaltube, cm. length	tapaltube, cm. width	tepalsegs sepsegs, cm. length	tepalsegs sepsegs, cm. width	petsegs, cm. length	petsegs, cm. width	Fragrance
Mayor Starzynski, 2n = 22; flower color bronzy-rose pastel	2.6	.55	7.5	2.1	7.7	3.3	very slight spicy
Tetra Starzynski[1], 2n = 44; flower color similar to diploid but deeper and richer colored	2.1	.65	8.3	2.8	8.5	4.8	slightly more spicy than diploid
Tetra Apricot, 2n = 44; segregate of Tetra Starzynski, flower color very rich apricot; eye zone very slightly reddish	2.2	.70	7.7	2.3	7.9	4.6	ditto

[1]Tetra Peach, 2n = 44; segregate of Tetra Starzynski, is similar to Tetra Starzynski, but the flower is deeper colored—near to a rich peach.

One duoclinal diplo-tetraploid chimera has been studied in some detail. The scapes produced during the first year after treatment were completely tetraploid on one side and diploid on the opposite side so that tetraploid flowers were produced on one side of the scape, and diploid flowers on the opposite side (Plate 14-A and B; Plate 16-C and D). In the second year, the diploid sector gained complete dominance over the tetraploid and no further scapes of this kind were produced. The seeds of selfs and crosses made with flowers on the diploid and tetraploid sides were stored for several months before they were planted, and they failed to germinate. Although it is the usual practice to store spring and summer outdoor-grown *Hemerocallis* seeds until late fall before they are planted, the greenhouse-grown seeds failed to germinate when similarly handled. This included diploid controls. Apparently, such greenhouse-grown seeds should be planted immediately or soon after maturity for satisfactory results.

Table 2. Breeding behavior of *Hemerocallis* diploids; colchicine-induced diplo-tet aploid chimeras, and complete unitary tetraploids; and seedling tetraploids.

Selfs or crosses	Chromosome ratio: pollen to style	Possible combinations	Expected pollen tube growth[1]	Progeny obtained
Mayor Starzynski self (style 2n = 22; pollen n = 11)	1:2	diploids	normal	diploids
Tetra Starzynski self (style 2n = 44; pollen n = 22)	1:2	tetraploids	normal	tetraploids[2]
Tetra Starzynski (style 2n = 44) ♀ x Stephen Foster (pollen n = 11) ♂	1:4	triploids	normal or reduced	nil (sterile?)
Stephen Foster (style 2n = 22) ♀ x Tetra Starzynski (pollen n = 22) ♂	1:1	triploids	much reduced	triploids
Tetra Starzynski (style 2n = 22) ♀ x Iowa (pollen n = 11) ♂	1:4	triploids	normal or reduced	triploids
Iowa (style 2n = 22) ♀ x Tetra Starzynski (pollen n = 22) ♂	1:1	triploids	much reduced	nil (sterile?)
Rosalind self (style 2n = 22; pollen n = 11)	1:2	diploids	normal$_{+}$(?)	nil (sterile) See Stout (1938).
Rosalind chimera[3] self (style 2n = ?; pollen n = 11 & 22)	See footnote[4]	diploids?, triploids?, tetraploids?	See footnote[4]	tetraploids
Rosalind chimera[3] (style 2n = ?) ♀ x Monterey (pollen n = 11) ♂	ditto	dipolids?, triploids	ditto	nil (sterile?)
Monterey (style 2n = 22) ♀ x Rosalind chimera[3] (pollen n = 11 & 22) ♂	1:2, 1:1	diploids, triploids	1:2, normal; 1:1, reduced or much reduced	diploids
E. W. Yandre chimera[3] (style 2n = ?) ♀ x Rosalind chimera[3] (pollen n = 11 & 22) ♂	See footnote[4]	diploids?, triploids?, tetraploids?	See footnote[4]	diploids
Reverse cross of above	ditto	ditto	ditto	nil (sterile?)
E. W. Yandre self (style 2n = 22; pollen n = 11)	1:2	diploids	normal	diploids
E. W. Yandre chimera[3] self (style 2n = ?; pollen n = 11 & 22)	See footnote[4]	diploids?, triploids?, tetraploids?	See footnote[4]	diploids
E. W. Yandre chimera[3] (style 2n = ?) ♀ x Berwyn (pollen n = 11) ♂	ditto	diploids, triploids?	ditto	diploids
Berwyn (style 2n = 22) ♀ x E. W. Yandre chimera[3] (pollen n = 11 & 22) ♂	1:2, 1:1	diploids, triploids	1:2, normal; 1:1, reduced or much reduced	diploids

[1]Expected on basis of work by Watkins (1932); Boyes & Thompson (1937); Jenkin (1933).—normal for ratio 1:2; normal or reduced for ratio 1:4; much reduced for ratio 1:1. According to Buchholz, as quoted by Blakeslee (1941), the ratio 1:1 causes bursting of pollen tubes on stylar tissue in *Datura*.

[2]F-1 tetraploid progeny are intra-fertile with Tetra Starzynski.

[3]Periclinal diplo-tetraploid chimera, with epidermis 2x and interior tissues 4 x.

[4]Ploidy of stylar tissue not investigated.

Flowers from ramet no. 12, colchicine-induced diplo-tetraploid chimeric scape of *xHemerocallis* clone MAYOR STARZYNSKI, diploid on one side and completely tetraploid on the opposite side: A, flower from diploid side of scape with pollen all n = 11; B, flower from tetraploid side of scape with pollen all n = 22. Approx. .85 natural size.

Plate 14

Flowers from colchicine induced diplo tetraploid chimeric scape of *Alternocallis* clone BERWYS. A, flower from periclinal chimeric branchlet from mericlinal chimeric scape with n = 11 & 22 pollen in the same anther; and B, flower from diploid branchlet from mericlinal chimeric scape with n = 11 pollen. Approx. .85 natural size.

Plate 15

Clone Berwyn

The ten colchicine-treated ramets of the clone Berwyn were placed in two classes on the basis of stomate and pollen grain sizes at the end of 1-1/4 years after treatment.

(a) Nine plants are diplo-polyploid chimeras (3A) similar to those indicated for the clone Mayor Starzynski, above. The diploid sectors are gradually gaining dominance over the polyploid sectors during the second year.

(b) One plant is of the duoclinal type, diploid on one side and diplo-tetraploid chimeric (3B) on the opposite side. Thus the flowering scape is diploid on one side (Plate 15-B; Fig. 19-C.) and diplo-tetraploid on the other. On the latter side some periclinal branchlets were produced which had flowers with n = 11 & 22 pollen in the same anther (Plate 15-A; Fig. 19-B; Fig. 21-C, D & E).

It is of interest to note the gross morphology of the flowers produced on the diplo-tetraploid chimeric branchlet as shown in Plate 15-A. Apparently the floral parts have been affected in a manner similar to that of the complete tetraploid (Plate 13-B), but not to the same extent. In Plate 15-A, the thickness of the tepaltube is noteworthy. The thicker texture of the flower apparently prevents the tepalsegs from recurving markedly as in the control (Plate 15-B).

The record of the breeding behavior of this chimera is incomplete because the seed lots for selfs and crosses were stored for the late fall planting and did not germinate. Only the cross, Dr. Stout (2n = 22) ♀ x the diplo-tetraploid side of the chimera ♂, with pollen n = 11 & 22 in the same anther, from seeds planted immediately after maturity, is represented in the progeny. These are all diploids (Plate 17-C), although one might expect diploids and triploids from such a cross. This subject will be elaborated in connection with the discussion of the breeding behavior of colchicine-induced polyploids in section IV.

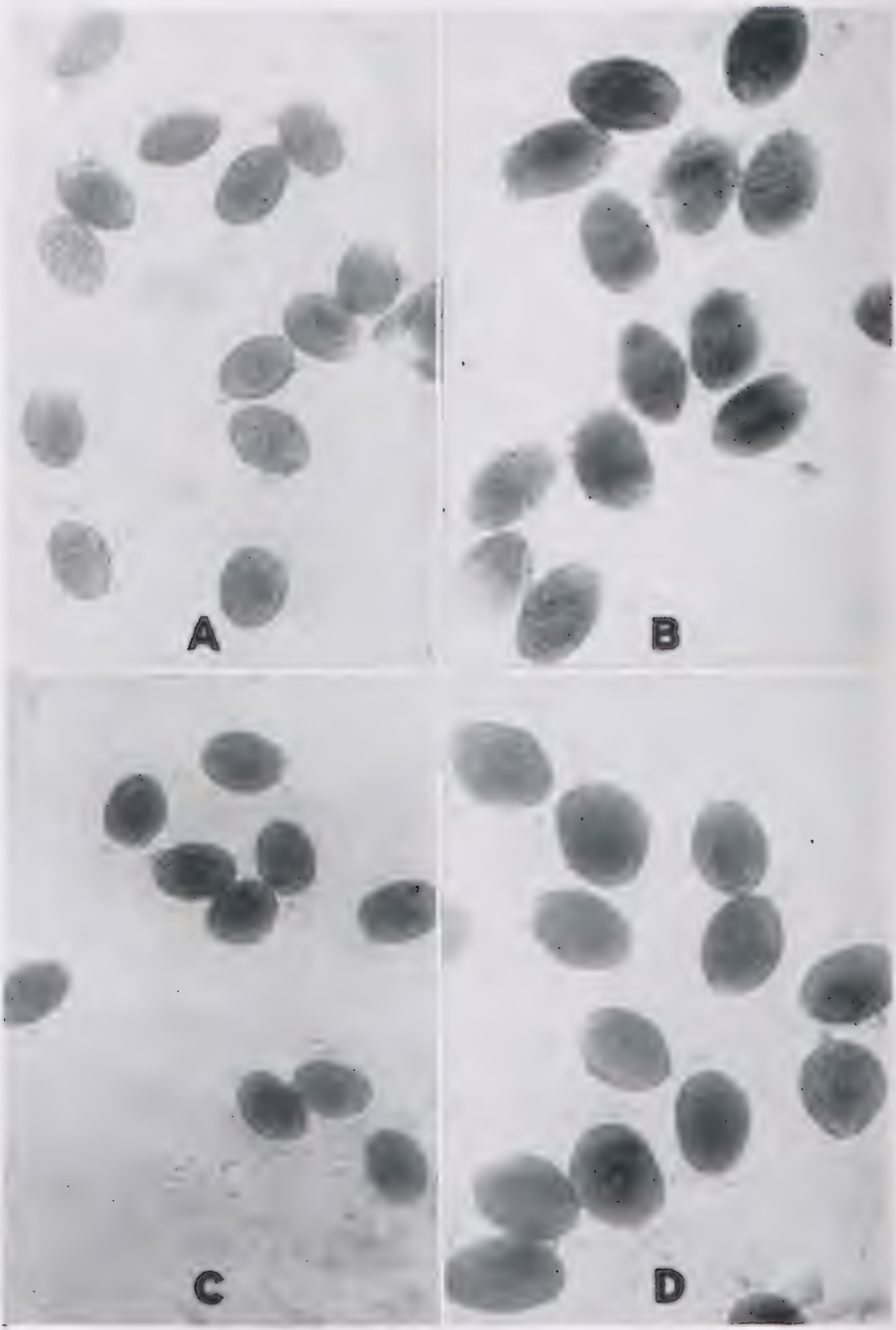
Clones Rosalind and E. W. Yandre

The colchicine-treated ramets of Rosalind and E. W. Yandre were placed in two broad classes on the basis of stomate size and pollen grain size, 1¼ years after treatment.

(a) Eight plants of Rosalind and one plant of E. W. Yandre are diplo-polyploid chimeras (3A) of the mericlinal type.

(b) Two plants of Rosalind and one plant of E. W. Yandre are diplo-tetraploid chimeras (3B) of the periclinal type (hereafter referred to as Rosalind chimera and E. W. Yandre chimera). In these chimeras the epidermis is diploid and the interior tissue is tetraploid. They produce flowers with n = 11 & 22 pollen in the same anther as shown for Rosalind chimera in Fig. 20-B. In the absence of direct proof as to the ploidy of the female gametes, dependence has to be placed on any available indirect proof supplied by the breeding behavior.

Rosalind (control, 2n = 22) is self-sterile but may be inter-fertile in some crosses (Stout, 1938). Since pollen of the diploid is ineffective



Pollen grains of *xHemerocallis* diploid and colchicine-induced unitary complete tetraploid and chimera (see bottom of opposite page for legend.)

Plate 16

on selfing, and the n = 11 & 22 pollen of ROSALIND chimera gave rise to tetraploids only (Plate 17-K), we have indirect proof of the presence of tetraploid female gametes in the ovules. Thus there seems to be no barrier to the growth of n = 22 pollen tubes in the stylar tissue.

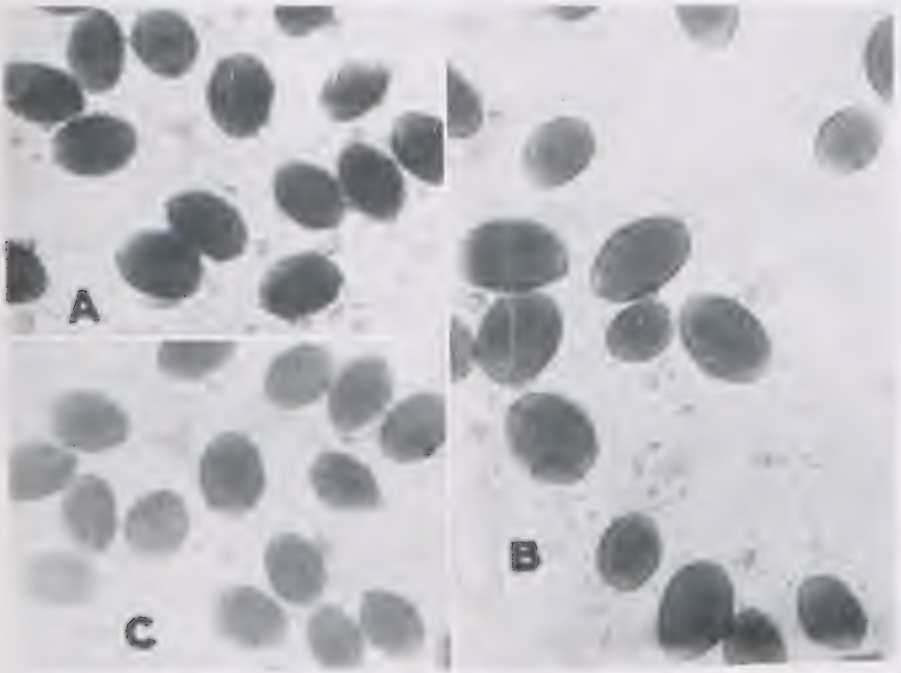


Fig. 19. *Hemerocallis* clone BERWYN, pollen grains in diploid and colchicine-induced diplo-tetraploid chimera: A, (control), n = 11; B and C, from opposite sides of same scape of colchicine-induced diplo-tetraploid mericlinal chimera: B, from periclinal branchlet of scape, n = 11 & 22 in the same anther; and C, diploid branchlet, n = 11. Mounted in Zirkle's gelatine-sorbitol-ferric-aceto-carmine (Zirkle, 1940). x10x10.

The 2n = 44 chromosome complement of one of the tetraploid seedlings, TETRA ROSALIND, the first studied, is shown in Plate 17-K. These tetraploids have not as yet flowered.

As indicated in Table 1, the cross of ROSALIND chimera (pollen n = 11 & 22) ♀ x MONTEREY, 2n = 22, ♂ was sterile, but the reverse cross gave rise to diploids only (Plate 17-L) although one might expect

Plate 16 (See opposite page for plate). Pollen grains of *Hemerocallis* diploid, colchicine-induced unitary complete tetraploid and diplo-tetraploid chimera: A, clone MAYOR STARZYNSKI, n = 11 (control); B, colchicine-induced unitary complete tetraploid, TETRA STARZYNSKI, n = 22; C & D, duoclinal diplo-tetraploid chimeric scape, Plant no. 12, C, diploid, n = 11, on one side, and D, colchicine-induced unitary complete tetraploid, n = 22, on the opposite side. All mounted in Zirkle's gelatine-sorbitol-ferric-aceto-carmine (Zirkle, 1940). x10x10.

to obtain triploids also. The reason for this behavior is at present unknown.

Previous experiments with pollen germination on artificial media have shown that in *Hemerocallis* the pollen tubes from the tetraploid grains grow at a relatively slower rate than those from the diploid grains, but so far no studies have been made of such growth rates in stylar tissues. Therefore further work is required before any positive statements can be made. In the meantime, the following hypothesis has been set up for testing.

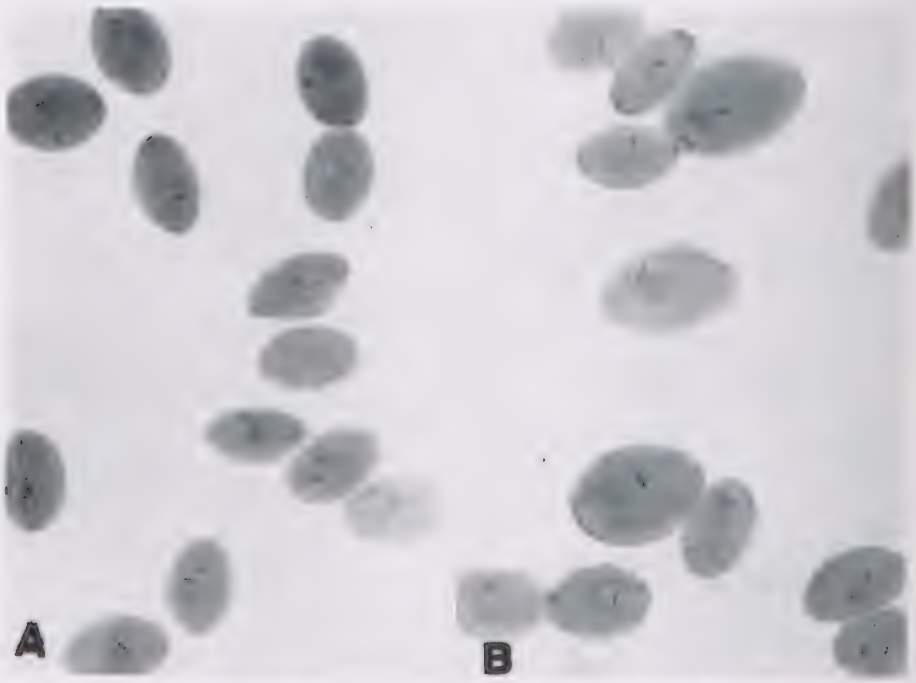


Fig. 20. Pollen grains of *Hemerocallis fulva* var. *rosea* clone ROSALIND Stout—A, control (not treated) n = 11; and B, ROSALIND conchicine-induced periclinal diplo-tetraploid chimera, n = 11 & 22 from the same anther. Mounted in Traub's uranyl-arabinate-sorbitol-ferric-aceto-carmine (Traub, 1951b). x20x10.

ROSALIND is self-sterile in the diploid state. Selfing of the ROSALIND chimera could then me equivalent to the selection of tetraploid pollen for application to the stigma in crossing with other clones since any growth rate differential in favor of n = 11 over n = 22 pollen on selfing ROSALIND chimera would be canceled out so long as the n = 22 male gametes arrived in time to fuse with the n = 22 female gametes. This growth rate differential might be of significance in such crosses as MONTEREY x ROSALIND chimera and E. W. YANDRE chimera x ROSALIND chimera when only diploids are obtained although triploids and/or

tetraploids might also be expected among the progeny.

E. W. YANDRE (2n = 22) is usually self- and inter-fertile as indicated in Table 1, but the cross of E. W. YANDRE chimera ♀ x ROSALIND chimera ♂ gave rise to diploids only. The reverse cross was sterile. This behavior is of interest in connection with the hypothesis outlined above. It should be noted that no seeds were obtained on ROSALIND diploid or ROSALIND chimera, except when the latter was selfed, and these were tetraploids.

E. W. YANDRE chimera (pollen n = 11 & 22) ♀ x BERWYN (pollen n = 11) ♂, and also the reverse cross gave rise to diploids, although triploids were also expected among the progeny.

The implication of the results presented will be considered further under the discussion in the following section.

IV. DISCUSSION

The breeding behavior of colchicine-induced *Hemerocallis* polyploids, the *Hemerocallis* breeding program, and the evolution of the chromosome complement in *Hemerocallis* will be briefly discussed.

Breeding Behavior

Tetra Starzynski selfs and crosses. The breeding behavior of the colchicine-induced tetraploid, TETRA STARZYNSKI, as indicated in Table 2, shows that chromosome ratios of pollen to style of 1:4 or 1:1, in these experiments involving diploids and tetraploids, are not always barriers to fertility. In 50% of the crossing attempts for each of these ratios fertility was observed. These results with *Hemerocallis* are in part contrary to the findings of Bucholz, as quoted by Blakeslee (1941), who reported that pollen tube growth in *Datura* is generally deleteriously affected by doubling chromosome number, and that 1x pollen tubes grow well in 4x conducting tissue of the style (chromosome ratio of pollen to style, 1:4), and 2x pollen tubes burst in the conducting tissue of 2x styles (chromosome ratio of pollen to style 1:1). The present results appear to be more in harmony with the findings of Watkins (1932) and Boyes and Thompson (1937), in specific wheat crosses, and Jenkin (1933) in herbiage crosses, who found that the optimum pollen tube growth was observed in styles of plants with the same chromosome number as the male parent, namely, if the chromosome ratio of pollen to style is 1:2. Pollen tube growth is normal or reduced in the style of a species with a higher chromosome number, whereas it is much reduced in the style with a lower chromosome number.

Selfs and crosses involving chimeras. When the periclinal diplo-tetraploid chimera of ROSALIND, which is self-sterile in the diploid state, was selfed, only tetraploids were obtained. When the periclinal diplo-tetraploid chimera of E. W. YANDRE, which is self-fertile in the diploid state, was selfed, only diploids were produced. According to the hypothesis outlined in the previous section, in the first case the n = 11 pollen tubes would apparently be ruled out from the beginning due to self-

sterility, and the n = 22 pollen tubes would have no competition, with the result that only tetraploids would be produced. In the second case, involving E. W. YANDRE chimera, the n = 11 pollen tubes apparently could compete actively with the n = 22 pollen tubes which might grow more slowly on the stylar tissue, and thus the former could win out, and diploids and triploids could be expected in the progeny if both n = 11

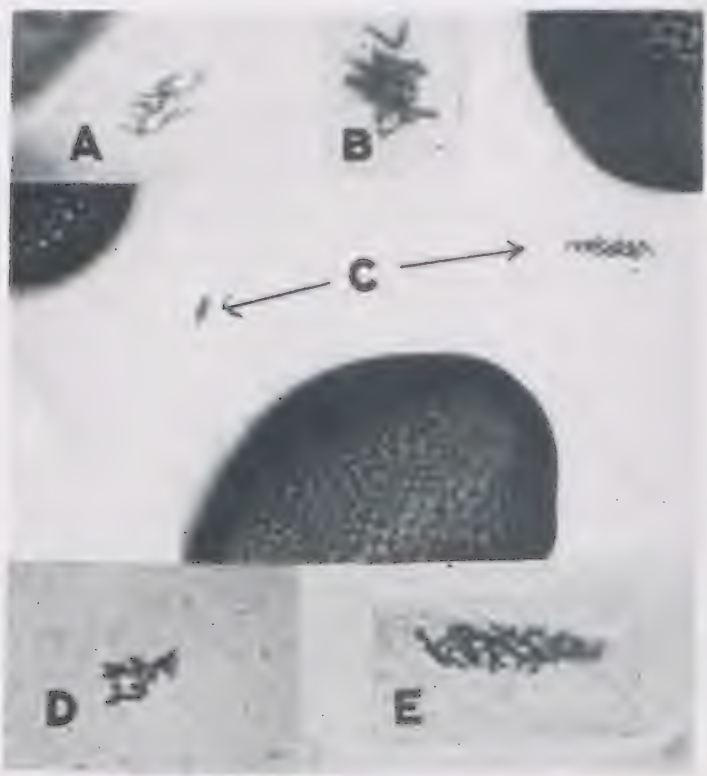


Fig. 21. Chromosomes in metaphase during pollen tube mitosis: A xHEMEROCALLIS clone MAYOR STARZYNSKI, n = 11 (x20x90); B, colchicine-induced complete tetraploid, TETRA STARZYNSKI, n = 22 (x20x90); C—E, incl., diplo-tetraploid chimera of clone Berwyn—C, metaphases of n = 11 (C-left) and n = 22 (C-right) pollen from same anther (x20x47.5); D & E, metaphases of n = 11 (D) and n = 22 (E) pollen from same anther (x20x90). Stained in leuco-basic fuchsin, and mounted in euparal.

and n = 22 female gametes were present in the ovules. However, only diploids were actually obtained. Only further work can fully explain the results.

In the case of ROSALIND chimera we have indirect proof that n = 22 female gametes were present in the ovules, and similarly we have indirect proof that n = 11 female gametes were present in the E. W. YANDRE chimera. It was not possible in the work so far to demonstrate

the presence of n = 11 and n = 22 female gametes in the same chimera. Since these chimeras are similar it is possible that both kinds of gametes were present in both, but only a more thorough investigation can settle this point conclusively.

In connection with these results, it is of interest to note that Emsweller and Stewart (1951) apparently selfed diplo-tetraploid *Lilium* chimeras and obtained only diploids. These workers concluded that "Evidently the gametes with 12 chromosomes have some advantage."

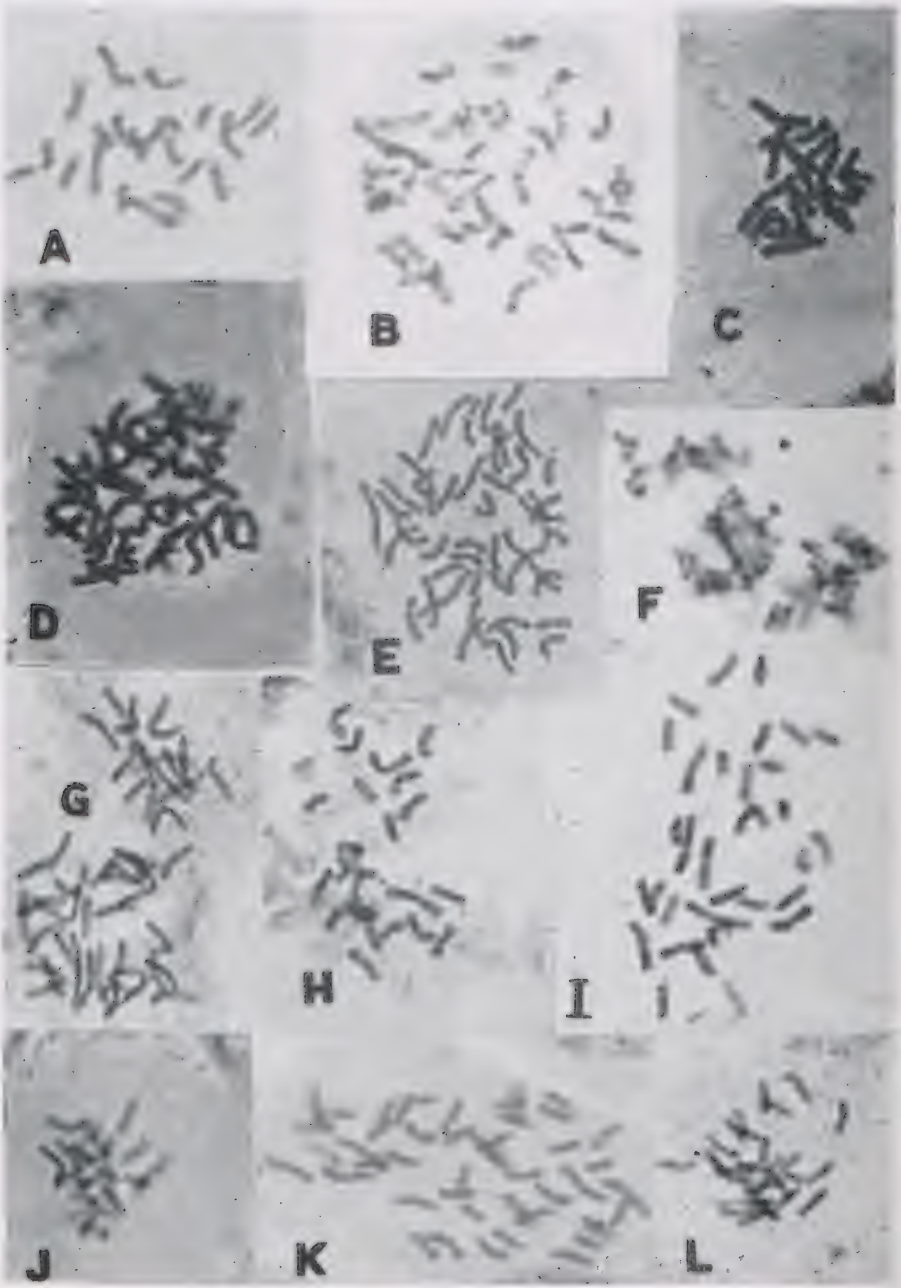
The *Hemerocallis* breeding program

The implications of the present results from the standpoint of the *Hemerocallis* breeding program will be briefly considered.

The results presented show above all that, contrary to the former belief, colchicine is an effective polyploidizing mutagen with *Hemerocallis* species and hybrids as previously reported by Traub (1949) and in the present paper if appropriate methods of application are employed.

In such genera as *Lilium* the procedure is relatively much more simple involving the soaking of the detached bulb-scales in .2% colchicine solution (Emsweller & Brierley, 1940; Emsweller, 1949). However, with most amaryllids, including *Hemerocallis*, which are characterized by a pseudo-bulb, the task is a very difficult one. In this case the non-meristematic leaf-bases—analagous to the meristematic bulb-scales in *Lilium*—are of no value with respect to the induction of polyploidy by colchicine poisoning. It is necessary to carry the colchicine solution into the apical histogenic layers and core while the plant is in active growth in order to induce polyploidy that may have any chance of permanency. Thus the external application of mutagenic solutions or pastes to the shoot apex in *Hemerocallis* after the leaf bases are sheared away, has proved ineffective in these experiments, and severe treatments by absorption or hypodermic injections of the mutagen have proved impracticable so far. Only when treatment was centered on the apical histogenic layers and core of the shoot in optimal repetitive doses punctuated by recovery periods was it possible to obtain a very small percentage of complete polyploids and a large number of diplo-polyploid chimeras in *Hemerocallis*. By using the latter class as parents, it is possible to achieve the objective of complete polyploidy indirectly by making use of appropriate breeding procedures.

The method for the induction of polyploidy in *Hemerocallis* is quite exacting. It should be emphasized that with plants such as *Hemerocallis* the following points must be observed: (a) the plants should be thrown back into a relatively more juvenile developmental stage by means of vertical stem cuttage (Traub, 1936b; 1936c) in order to take advantage of the more active growth thus induced. Another consideration also is important. Apparently the whole stem divisions of the clump present a relatively large mass of tissue that may contain relatively large amounts of colchicine-antagonistic substances (Cornman, in press 1950). For a similar reason large woody plants cannot be effectively treated by this method as shown by Traub (unpublished



xHemerocallis chromosomes in metaphase during root-tip mitosis (see bottom of opposite page for legend).

Plate 17

results) with *Malus sylvestris* (WINESAP and JONATHAN clones) where small root-grafts had to be utilized for effective results. With woody plants the optimum doses may have to be relatively greater (up to .1% or .2%) than for herbaceous plants like *Hemerocallis*. On the other hand, it is difficult to keep relatively small *Hemerocallis* seedlings growing effectively during the repetitive treatments as compared with plants propagated from single stem divisions by vertical stem cuttage. (b) The mutagen should be supplied to the apical histogenic layers and core of the shoot through the roots so that it is present in the entire apical region where it may come into contact with all of the cells that are dividing during any particular treatment period. (c) The treatment as to concentration (.025% to .05% colchicine), and times of treatment, should be optimal rather than maximal (.1% to .2% colchicine) as is the usual practice at present with most other plants. The concentration must be just sufficient, and the time of action just long enough to cause polyploidy, and never so severe as to give the plant a distinct set-back. (d) The colchicine treatment should be repetitive, namely 4 to 8, sometimes more, 8-hour periods, punctuated with relatively longer (16-hour) recovery periods in a complete nutrient solution, so that the plant will again be in active growth at the beginning of each successive treatment. In some cases it may be advisable to make the recovery periods longer, up to one or two days, but this is only necessary when a clone such as LIDICE, relatively more sensitive to colchicine, receives a decided set-back even by the optimal treatment. By repeating the polyploidizing process four or more times, the probability of producing relatively large and numerous polyploid sectors in the apical shoot tissues is increased.

This method is applicable to other plants as shown by the unpublished results obtained by the present writer on the basis of root-tip mitoses—particularly to monocotyledons such as the bulbous *Amaryllidaceae: Leucojum autumnale*, *Crinum asiaticum*, etc. and also dicotyledons: *Impatiens sultani*, *Phaseolus vulgaris*, *Arachis hypogaea*, *Raphanus sativus*, *Malus sylvestris* (WINESAP and JONATHAN clones), etc. The pioneer work of Wellensiek (1947), who reported success with wheat-rye hybrids by means of a similar method, should not be overlooked.

According to Popham & Chan (1950), Satina's layer-core terminology (Satina & Blakeslee, 1941) of the developing shoot apex is a

Plate 17. (See opposite page for plate.) *Hemerocallis* chromosomes in metaphase during root-tip mitosis: A, clone MAYOR STARZYNSKI (control), 2n = 22; B, colchicine-induced unitary complete tetraploid, TETRA STARZYNSKI, 2n = 44; C, diploid, 2n = 22, from cross, DR. STOUT (n = 11) ♀ x diplo-tetraploid chimera of clone BERWYN ♂ (n = 11 & 22); D to F, incl., seedlings obtained by selfing TETRA STARZYNSKI, D, 2n = 44, TETRA APRICOT, E, 2n = 44, TETRA PEACH, and F, 2n = 44. Seedling #583; G, TETRA APRICOT ♀ x TETRA STARZYNSKI, 2n = 44 ♂; H, clone STEPHEN FOSTER, 2n = 22; I, STEPHEN FOSTER, 2n = 22 ♀ x TETRA STARZYNSKI ♂, 2n = 33/2; J, clone ROSALIND, 2n = 22; K, complete tetraploid seedling TETRA ROSALIND, 2n = 44, obtained by selfing periclinal diplo-tetraploid chimera with n = 11 & 22 pollen in the same anther; L, Seedling, 2n = 22, obtained by crossing MONTEREY ♀ with ROSALIND periclinal diplo-tetraploid chimera (n = 11 & 22 pollen in the same anther). All shortened by pretreatment for 2½ hours in sat. solution of acenaphthene in .5% ethanol (Traub, 1951c), and mounted in Traub's bismuth-arabinate-sorbitol-ferric-aceto-carmine (Traub, 1951b). x20x90.

distinct improvement over the Schmidt (1924) and Buder (1928) tunica-corpus terminology because "it does not imply anything regarding the occurrence of periclinal cell divisions in the outer layers, thus permitting the worker to record his observations more accurately. In addition, the terminology is applicable to all gymnosperm and angiosperm apexes. The problem of determining the number of 'layers' in itself is not always an easy one."

It is of interest to note that the validity of this concept has been verified on the basis of sectorial polyploidy in *Datura* by Satina & Blakeslee (1941), and in cranberry and various bud sports by Dermen (1945; 1947a; 1947b). The developmental morphology of the shoot apex in *Hemerocallis* has not as yet been studied. Dr. Popham of the Department of Botany, Ohio State University, or one of his graduate students, will work out the problem in the future from material furnished by the writer. Therefore no statement about the number of apical histogenic layers, in addition to the core, of the shoot apex that are subject to colchicine-induced polyploidy in *Hemerocallis* can be made at present. In the meantime, the present results may be tentatively interpreted, without indicating the number of histogenic layers, on the broad basis of the layer-core terminology reference frame which is applicable to all gymnosperms and angiosperms as indicated by Popham & Chan (1950). Thus the histogenic layers, whatever their number, and core of the shoot apex in *Hemerocallis*, during colchicine treatment, may be polyploidized in toto, or one or more layers, including or not including the core, may be totally affected, or in part only to one or more degrees of ploidy. This would explain not only the small percentage of complete polyploids, but also the larger class of treated plants included under diplo-polyploid chimeras (3A) obtained, in which partial polyploidy was observed.

Since this report is written for readers that include enthusiastic practical gardeners, who may wish to try their hand at the very difficult task of producing polyploid *Hemerocallis*, a word of caution is in order with respect to reporting results obtained. Above all, the burden of proof is on the worker as in all scientific work. External appearances during the first growing season may be deceptive from the standpoint of the permanency of the changes induced. It is necessary to observe the treated plants for two or more years after treatment in order to be certain as to the permanency of the mutations. During the first flowering season, it is possible to determine tentatively the diploid or the polyploid state on the basis of pollen grain size and n chromosome numbers in pollen tube mitoses. If all of the pollen grains in the anther are polyploid (larger than in the control) in any particular plant, then there is promise that the changes may prove to be permanent. If the anther contains $n = 11$ and $n = 22$ pollen grains, for instance, then there is evidence of a chimeric condition, and the diploid tissues may gain dominance over the polyploid tissues later, or the reverse. The same is true when part of the plant produces flowers that are diploid and the other part polyploid flowers. After the treated *Hemerocallis* plant produces roots from tissues developed from initially polyploidized

histogenic layers in the shoot apex that were subjected to colchicine treatment, then it will be possible to obtain data on the 2n chromosome number from root-tip mitoses. If this shows polyploidy, one may conclude safely that polyploidy is permanent as far as these particular tissues are concerned. The criterion of stomate size is of secondary importance at the outset since it is not easy to examine all of the leaf surface, but if taken in conjunction with chromosome numbers as shown by pollen tube and root-tip mitoses two or more years after treatment, it should add to the completeness of the proof. If the plant is completely polyploid as is rarely the case, the task is finished, but that is not so if one is confronted with partly polyploid plants or chimeras. The next step is then to make an attempt to obtain completely polyploid plants through breeding of chimeric plants. This is briefly discussed in the following paragraphs.

Since it is very difficult to obtain complete unitary polyploids (Plate 17-B) directly—results being usually nil or less than 1%, very rarely as high as 10%—by colchicine treatment by methods devised so far, it is necessary above all to include a large number of treated plants so as to increase the chances of achieving the desired objective. When complete unitary polyploids are not obtained, and the treated plants consist of diplo-polyploid and/or polyploid chimeras, it may be possible to obtain complete unitary polyploids indirectly in some cases by further breeding as already briefly indicated. The present results show for instance that in the case of the colchicine-induced periclinal diplo-tetraploid chimera of *Hemerocallis fulva* var. *rosea* clone ROSALIND, complete tetraploids (Plate 17-K) were obtained by selfing. This was to be expected because this clone is self-sterile in the diploid state so that only the n = 22 gametes are functional. In cases where the periclinal chimera is self-fertile in the diploid state, it might be possible to obtain tetraploids and triploids by sorting out the n = 22 pollen with the aid of the microscope for use in selfing.

Triploids (Plate 17-I) may be obtained by crossing colchicine-induced tetraploids with diploids if the parents are inter-fertile in the diploid state. When the tetraploid and diploid are inter-sterile, and diploids only are produced by crossing the chimera and a diploid (Plate 17-L), triploids might be obtained by sorting out the tetraploid pollen for use in the cross. It should be realized that in cases where only diploids appear when triploids and/or tetraploids are also expected in the progeny, the mechanism involved is not known at present, and suggestions given are based on an hypothesis.

Evolution of chromosome complement in *Hemerocallis*

Finally, a brief reference to the meaning of the results from the standpoint of experimental evolution on the level of quantitative mutation in chromosomes is in order. The genus *Hemerocallis* is a relict, and is the only one in the tribe *Hemerocalleae* (Traub and Moldenke, 1949, p. 12). Stout (1932) pointed out that *Hemerocallis* species in nature are quite uniform from the standpoint of chromosome numbers, all having the basic n = 11, with the diploid 2n = 22, excepting in a few triploids. He also indicated that "As long as the seedlings obtained have one parent which is diploid there is little chance of advancing to higher levels of polyploidy." The hurdle has now been made with the production of such colchicine-induced tetraploids as TETRA STARZYNSKI (Traub, 1949) and the tetraploid segregates obtained by further breeding—TETRA ROSALIND, TETRA PEACH, TETRA APRICOT and other unnamed tetraploids.

So far no aneuploids have been observed in these experiments. Although more than 25 seedlings have been obtained by selfing TETRA STARZYNSKI, only half of these have been studied in detail as to chromosome numbers because of the press of other work. All of those examined are tetraploids. Thus the chromosome series now is 2n = 22, 33/2 and 44. If aneuploids should occasionally appear among the segregates of the tetraploids, then the series could be amplified by aneuploid 2n numbers intermediate between the 2n = 33/2 and 2n = 44 euploid numbers.

It has already been noted that the *Hemerocallis* shoot apex is effectively insulated from the effects of external stimuli such as low or high temperature that might affect ploidy stability, and this is probably the reason why polyploidy has not entered to any marked extent into the evolutionary mechanism in this genus. Ploidy is restricted to the 2n = 22 level, except for only a few sterile triploids. Thus the influence of polyploidy in the evolution of this genus in nature is apparently postponed indefinitely, and its operation, if at all, from the standpoint of our own time frame, is dependent on the intervention of man.

The diploid clone MAYOR STARZYNSKI (Traub, 1939, 1940), 2n = 22, is a complex moderately self-fertile hybrid of unknown parentage as far as the records are concerned, but the vegetative and floral characters (Fig. 16-B; Plate 13-A) indicate that *H. multiflora*, *H. aurantiaca*, and apparently also some other species were involved in its heredity. It is one individual selected from a breeding progeny of many thousands. The breeding procedure was carefully planned to greatly speed up diversification in *Hemerocallis* hybridization by making it possible to obtain various crosses in a single capsule as contrasted with the slower tempo when two parents only are represented in a single capsule with the usual practice. Mixed pollens from more than 100 different individuals (including several species and some hybrids) were applied to about 100 different pistillate species and hybrid parents through several generations. Apparently this made possible the survival of the most advantageous chromosomal combinations from the standpoint of fertility due to survival in competition. Part of the pistillate and

pollen parents were replaced by additions selected from a new generation of hybrids coming into flower in each year. After a few years of selective breeding, a large percentage of the progeny became moderately to highly self- and inter-fertile.

The colchicine-induced tetraploid of MAYOR STARZYNSKI is therefore an allopolyploid because several species apparently are represented in its make-up as shown by the gross morphology. It now remains to consider the systematic position of the group of which the tetraploid is the type.

(a) The allotetraploid is self-fertile and also intra-fertile with its progeny and thus these are being maintained as a distinct intrabreeding group in the same manner as is possible with other synthetic species (Clausen & Goodspeed, 1925; Clausen, 1928). This is aside from the intriguing experimental project of attempting to establish the group as a self-perpetuating one in the wild which remains for the future.

(b) When diploid pollen parents are crossed on individuals of the intrabreeding tetraploid group triploids only are produced if progeny are obtained. Thus the group is effectively isolated reproductively from all other similar groups in the genus due to this difference in ploidy level.

(c) On the basis of the gross morphological characters, the tetraploid group (Table 1) can be readily recognized as distinct from the diploid whence the group is descended and from all recorded species in the genus.

In harmony with the usual procedure of considering self-fertile allopolyploids of this kind as candidates for species rank (Clausen & Goodspeed, 1925; Clausen, 1928; Dobzhansky, 1941) on the level of such synthetic taxons as *Nicotiana digluta*, the group under consideration is proposed as a new species.

Hemerocallis washingtonia Traub, **sp. nov.**—Herbae perennes; foliis numerosis auguste lanceolatis usque ad 81 cm. longis, medio 2 cm. latis, ad apicem acutis, ad basim 1.5 cm. latis; scapo usque ad 102 cm. alto, ad basim 1 cm. lato, apicem versus paulo angustato, ulta 67 cm. altitudinis brachiato; ramis secundariis 8—18 cm. longis; floribus 35 per scapum; ovario superiore; tubo tepalorum 2.1—2.2 cm. longo, 0.65—0.7 cm. lato; segmentis sepalorum 7.7—8.3 cm. longis, 2.3—2.8 cm. latis, late lanceolatis obtusis; segmentis petalorum 7.9—8.5 cm. longis, 4.6—4.8 cm. latis, late oblanceolatis, ad apicem rotundatis; staminibus 6.7 cm. longis; stylo stamina 2.5 cm. excendenti.

DESCRIPTION.—Perennial herbs; leaves numerous, narrowly lanceolate, up to 81 cm. long, 2 cm wide at the middle, pointed at the apex and 1.5 cm. at the base; scape up to 102 cm. tall, 1 cm. in diam. at the base, narrowing somewhat upwards, branching at the height of 67 cm.; secondary branches 8—18 cm. long; up to 35 flowers to the scape; ovary superior; flowers wide open, brilliant bronzy-rose-, peach- or apricot-colored; modestly fragrant; tepaltube 2.1—2.2 cm. long, 0.65—0.7 cm. wide; sepsegs 7.7—8.3 cm. long, 2.3—2.8 cm. wide, broadly lanceolate, obtuse; petsegs 7.9—8.5 cm. long 4.6—4.8 cm. wide, broadly oblanceolate, rounded at the apex; stamens 6.7 cm long; style 2.5 cm. longer

than the stamens. Type: Traub nos. 196—198; type illus. Figs. 16-A, 17-B-D-F-H, 18-B; Plates 13-B, 16-B, 17-B-D-E-F.

V. SUMMARY

(1) The usual methods employed for the induction of polyploidy in herbaceous plants by maximal colchicine-poisoning (colchicine 1% to 2% concentration) are relatively ineffective in the case of *Hemerocallis* where the cells of the apical histogenic layers and core of the shoot apex must be effectively polyploidized by the poisoning mutagen while the plant is in active growth if satisfactory results are to be obtained.

(2) Therefore, the method of minimal application of colchicine (.05% solution) to the apical histogenic layers and core of the shoot apex by absorption through the roots in 4 to 8, or more, 8-hour repetitive treatments, alternated with 16-hour recovery periods, was used to induce polyploidy in *Hemerocallis* with the following results:

(a) One *complete* colchicine-induced tetraploid *Hemerocallis* clone, Tetra Starzynski (2n = 44), the first ever reported, was obtained directly, showing that it is most difficult to induce complete unitary polyploidy directly by any method of colchicine-poisoning as yet reported—usually nil, very rarel up to 10%.

(b) The rest of the treated plants were colchicine-induced diplo-polyploid chimeras, including the mericlinal and periclinal types, from some of which *complete unitary* polyploids may be obtained indirectly by breeding methods as indicated under (3b & c) below, although in most cases the diploid sectors in the chimeras are gradually gaining dominance over the polyploid sectors. Thus, in difficult material such as *Hemerocallis* it is not necessary to obtain *complete unitary* polyploids directly, a most difficult task at best, since these may be obtained more easily indirectly by breeding methods from the colchicine-induced chimeras.

(3 The breeding behavior of the colchicine-induced complete tetraploid and the diplo-tetraploid chimeras was tested with the following results:

(a) More than 25 F-1 complete tetraploid segregates (2n = 44) were obtained by selfing the colchicine-induced tetraploid, Tetra Starzynski (2n = 44), and by the cross between one of these segregates, Tetra Apricot (2n = 44) x Tetra Starzynski (2n = 44).

(b) Complete triploids (2n = 33/2) were obtained by crossing the colchicine-induced tetraploid, Tetra Starzynski, with diploids.

(c) Complete tetraploids (2n = 44) were obtained by selfing the colchicine-induced periclinal diplo-tetraploid chimera of Rosalind, which produces n = 11 & 22 pollen in the same anther. The production of only tetraploids in this case is apparently due to the fact that the clone Rosalind is normally self-sterile in the diploid state so that only the n = 22 pollen is functional with the n = 22 female gametes.

(4) The method described for *Hemerocallis* may be applied for the induction of polyploidy by colchicine-poisoning in other difficult plant material as shown by the unpublished results obtained by the writer.

(5) With the addition of tetraploids, the chromosome series in *Hemerocallis* is now 2n = 22, 33/2 and 44 from the standpoint of quantitative experimental evolution of the chromosome complement in this genus. If aneuploids should occasionally appear in the F-1 progeny of the colchicine-induced tetraploids, or could be obtained by crossing of triploids and tetraploids, then the series could be amplified by the addition of intermediate 2n numbers between 2n = 33/2 and 2n = 44.

(6) The synthetic species, *Hemerocallis washingtonia* Traub, *sp. nov.*, the first tetraploid species in the genus, is proposed.

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×AMARYLLIS HENRYAE—A MINIATURE PINK MARVEL

HAMILTON P. TRAUB, *Maryland*

In 1948, Mrs. Mary G. Henry, of Gladwyne, Penna., made the cross, *Amaryllis belladonna* var. *haywardii* ♀ x *Amaryllis espiritensis* ♂ (see Plate 6 and Fig. 1) and produced the miniature pink marvel shown in

Fig. 22. *×Amaryllis henryae* Traub, *hybr. nov.* (type): (*Amaryllis belladonna* var. *Haywardii* ♀ x *Amaryllis espiritensis* ♂). This hybrid, produced by Mrs. Mary G. Henry, represents a most outstanding achievement in *Amaryllis* breeding.

Fig. 22. This is without doubt the most outstanding achievement in the entire history of the genus *Amaryllis* under cultivation—

(a) The flower of the type (Fig. 22) is a most beautiful pink (=

carmine, R.H.S. Chart, 21/1). Two additional individuals that flowered for Mrs. Henry in December 1950, are even more beautiful pinks, if that should be possible.

(b) The plant is small in stature so that 3 or more bulbs can be grown in a 5-inch pot. This has been the objective of *Amaryllis* breeders for a long time past.

(c) The plant is vigorous and increases rapidly by offsets so that commercial growers will be able to work up large stocks in a relatively short time.

(d) The hybrid apparently blooms normally in December, and thus can be forced for the Christmas trade.

We are indebted to Mr. Mulford B. Foster, for bringing back the smaller statured species, *Amaryllis espiritensis*, from Brasil; to Mr. Carricker, Jr., Dr. de Schauensee and Mrs. Henry for giving us *Amaryllis belladonna* var. *haywardii* (native to Bolivia), the first real pink *Amaryllis*, and to Mrs. Henry for making the synthesis that now gives us the first real miniature pink grandiflora hybrid *Amaryllis*. The hybrid is appropriately named for its originator, Mrs. Henry.

xAmaryllis henryae Traub, **hybr. nov.**—(*Amaryllis belladonna* var. *haywardii* ♀ x *A. espiritensis* ♂) Planta bulbosa; bulbo parvo; foliis persistentibus spathulatis usque ad 31 cm. longis, usque ad 3 et 3.5 cm. latis vel paullo latioris; scapo 15—16 cm. alto; spatha bivalvata, valvis 5.5 cm. longis lanceolatis; umbella biflora; pedicellis sub anthesi 2.5—3.5 cm. longis; ovario ca. 8 mm. longo; tubo tepalorum 2.5 cm. longo; segmentis tepalorum carminio-roseis lanceolatis 7.5—8 cm. longis, 1.7—3.2 cm. latis; staminibus styloque exsertis.

Description.—Bulb small; leaves evergreen, spatulate, up to 31 cm. long, up to 3 and 3.5 cm. wide, or somewhat wider; scape 16—18 cm. tall; spathe 2-valved, valves 5.5 cm. long, lanceolate; umbel 2-flowered (in type); pedicels 2.5—3.5 cm. long at anthesis; ovary about 8 mm. long; tepaltube 2.5 cm. long; tepalsegs carmine, lanceolate, 7.5—8 cm. long, 1.7—3.2 cm. wide; stamens and style exserted. Type: Traub nos. 194 and 195, in the Traub Herbarium; type illustration, Fig. 22.

xAMARYLLIS GLADWYNENSIS

Mary G. Henry, *Pennsylvania*

The fact that there are 56 fine healthy bulbs, mostly of flowering size, of *xAmaryllis gladwynensis* is more owing to the prowess of the plants themselves than it is to any effort on my part.

The acquisition of my treasured bulb of *Amaryllis belladonna* var. *haywardii* occurred in 1944. This important and unorthodox event was duly chronicled on page 83 of Herbertia, 1949.

(Left) *xAmaryllis johnsonii* Johnson ex Herb., from Naga Hills, India; (right) **xAmaryllis gladwynensis** M. G. Henry, **hybr. nov.** [*Amaryllis belladonna* var. *Haywardii* ♀ x *xAmaryllis johnsonii* (Naga Hills, India clone) ♂]. Photo by Mary G. Henry.

Plate 18

At the same time that *A. belladonna* var. *haywardii* was in bloom, a handsome vigorous red-flowered *xAmaryllis* was also in bloom. This was identified by Dr. Traub as *xAmaryllis johnsonii* (Plate 18, left). The bulb was sent to me by my daughter Josephine in 1945. She was in Assam with the Red Cross at the time. An army truck driver had brought it to her saying, "Here is a red Lily I got in the Naga Hills."

It was about January 1st, 1948, when I made the crosses, *A. belladonna* var. *haywardii* X *xA. johnsonii* (= *xAmaryllis Gladwynensis;* Plate 18, right) and *A. belladonna* var. *haywardii* X *A. espiritensis* (= *xAmaryllis henryae;* Fig. 22). The little tags that registered the crosses can plainly be seen in the picture page 85, Herbertia 1949. The seeds ripened in about two months. I planted one 12 x 12 inch flat with seeds of the first mentioned cross. It was March. Spring was in the air, the outdoors called me and I answered with my trowel and spade. The remaining seeds stayed where they had fallen to the sand of the greenhouse bench below them and there they sprouted and remained until the following autumn.

The seed pod pollinated with *A. espiritensis* was a bit later in ripening. Every one of these fell to the sand March 20th, where they sprouted and survived the summer, when they were planted in a flat and numerous pots. There are 44 of these. The plants developed from the seeds that had fallen to the sand were completely neglected by me, but there were orchids hanging overhead and when I sprinkled them, the baby *xAmaryllis* received a share and doubtless, too, received nutrition from this source.

So it was as usual, except for a few minutes to water night and morning, that I spent my days outside tending my Liliums of which I have over 125 species and varieties, my numerous deciduous *Rhododendron* seedlings, etc., etc.

By Autumn the *xAmaryllis* had developed into stout little bulbs. I admired enormously their courage and their "will to live," took pity on them and from then on have tried to take care of them.

Early in January, at an age of 1 year and 10 months, a flower bud emerged from one of the pot grown bulbs of *Amaryllis belladonna* var. *haywardii* X *xA. johnsonii*. Little did I know of the treat that was in store for me.

Not long afterward, this, my first hybrid *Amaryllis* seedling, expanded its utterly beautiful and utterly gorgeous carmine-pink flowers (Plate 18, right). Even if I had dreams for my first one, the flowers when they came exceeded my highest hopes.

Before the season was over, and while still under two years of age, *xAmaryllis gladwynensis* had produced three stalks of its stunning flowers.

xAmaryllis gladwynensis M. G. Henry, **hybr. nov.**—[*Amaryllis belladonna* var. *haywardii* ♀ X *A. johnsonii* ♂]. Planta bulbosa; bulbo magno; foliis 6—8 lanceolatis usque ad 62 cm. longis, medio 3.5 cm. latis; umbella 2—4-flora; ovario 3 cm. longo; tubo tepalorum 3.5 cm.

longo; segmentis tepalorum lanceolatis 10 cm. longis, 2.2—4 cm. latis, in typo carminio-roseis; paraperigonio nullo; staminibus pistillo brevioribus; pistillo segmentis tepalorum 3 cm. breviore; stibmate obscure trilobato.

DESCRIPTION.—*Amaryllis belladonna* var. *haywardii* ♀ X *xAmaryllis johnsonii* ♂; bulb large; leaves 6—8, lanceolate, up to 62 cm. long, 3.5 cm. wide in the middle; umbel 2—4-flowered; ovary 3 cm. long; tepaltube 3.5 cm. long; tepalsegs lanceolate, 10 cm. long, 2.2—4 cm. wide, carmine in type, other shades of red may appear in other individuals; paraperigone absent; stamens shorter than than style, which is 3 cm. shorter than the tepalsegs; stigma obscurely trilobed. Type: nos. 108 and 109, in the Traub Herbarium; type illustration, Plate 18, right.

NOTES.—The individual of *xAmaryllis johnsonii* used in the cross is shown in Plate 18, left.

xHABRANTHUS FLORYI

HAMILTON P. TRAUB, *Maryland*

In 1940, the hybrid, *Habranthus brachyandrus*, 2n = 24, ♀ X *H. tubispathus* (syn. *robustus*), 2n = 12 ♂, was reported (HERBERTIA 7: 167—168. 1940.). Flory, in 1941 reported the somatic chromosome number of this hybrid as 2n = 18 (Ann. Rept. Tex. Agr. Expt. Sta. *54*: 54. 1941; Amer. Jour. Bot. *35*: 791—792. 1948). The reverse cross is relatively more difficult to make, and only a few such plants have thus far been obtained.

This interesting hybrid (see HERBERTIA *8*: 92. 1942) has now been named, *xHabranthus floryi* [Fig. 23], in honor of Dr. W. S. Flory, who has contributed much toward the advancement of the amaryllids.

xHabranthus floryi Traub, **hybr. nov.**—[*H. brachyandrus* X *H. tubispathus*]. Bulbus illi Habranthi brachyandri consimilis; foliis linearibus 36—40 cm. longis, 8 mm. latis, basim versus valde angustatis, versus apicem leviter angustatis; scapo 22 cm. alto; umbella uniflora; spatha 4—4.5 cm. longa, dimidio inferiore in tubo connato; pedicello 7—7.5 cm. longo; ovario 1 cm. longo; tubo tepalorum 8 mm. longo; segmentis tepalorum 4-seriatis 9—9.5 cm. longis, 1—2.7 cm. latis, lanceolato-obtusis rubellis, gula subviridi; paraperigonio in gula fimbriis composito; staminibus fasciculatis declinato-adscendentibus 4-seriatis, stylo brevioribus; stylo segmentis tepalorum 3.5 cm. breviore; stigmate 3-lobato, lobis 3—4 mm. longis.

DESCRIPTION.—Bulb similar to that of *Habranthus brachyandrus:* leaves linear, 36—40 cm. long, 8 mm. wide, narrowed markedly toward base, less so toward apex; scape 22 cm. tall; umbel 1-flowered; spathe 4—4.5 cm. long, united into a tube in lower half; pedicel 7—7.5 cm. long; ovary 1 cm. long; tepaltube 8 mm. long; tepalsegs of 4 different

sizes. 9—9.5 cm. long, 1—2.7 cm. wide, lanceolate-obtuse, pink, greenish at throat; paraperigone of fimbriae at the throat; stamens fasciculate, declinate-ascending, of 4 different lengths, shorter than the style which

Fig. 23. *xHabranthus floryi* Traub, hybr. nov. [*Habranthus brachyandrus* ♀ x *Habranthus tubispathus (robustus)* ♂]. Named in honor of Dr. W. S. Flory.

is 3.5 cm. shorter than the tepalsegs; stigma 3-lobed, lobes 3—4 mm. long. *Habranthus brachyandrus* (seed parent) X *H. tubispathus* (L'Herit.) Traub. Type: no. 189 in the Traub Herbarium; type illustration, Fig. 23.

4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

THE BLUE AMARYLLIS—WORSLEYA RAYNERI

I. Introduction, by Edith B. Strout, *Chairman, General Amaryllid Commmittee*, Kentfield, California

When I first read about *Worsleya Rayneri* of the Organ Mountains of Brazil, I thought immediately of the coastal area of California just north of San Francisco, particularly the moors around Point Reyes, where there are rocky cliffs, much fog, yet never freezing weather. It seemed a natural setting for trying to naturalize this blue amaryllid in this country.

Although I live a little further inland where fogs are less frequent and our summers very dry, I had a keen desire to try some of these bulbs if I ever had the opportunity. But it was not until 1948 when Mrs. Meadows and Miss Breckenridge imported some for the Amaryllis Round Robins that the experiment could be begun.

In August of that year I received three bulbs of *Worsleya rayneri*, two of which I have kept. Having no granite available, I planted two in 5 gallon cans using broken parts of concrete and Haydite building blocks for filler, and sand and leaf mold on top of this. One of the bulbs (later disposed of) was so situated that a light spray from the leaking hose nozzle played over it every day and it seemed to root quite quickly. The other two took many months, in fact, nearly a year before they rooted. One was kept outside even in the cold weather of 1949 and 1950 (20° F.) and seems happy in our foggy cold winters. The other one was kept inside the house; this one having more loam than leaf mold. Although it had rooted, the bulb is shriveling and is loose in the soil, obviously objecting to its surroundings and struggling hard to keep alive. It probably dislikes the dryness of my dwelling. I still feel that nearer the ocean where there is fog part of the day for the greater part of the year, *Worsleya Rayneri* would feel right at home. Unfortunately I do not know any amaryllid enthusiasts in such a location.

Endeavoring to find the right cultural requirements for my bulbs, it was with great interest and satisfaction that I received and read the letters from Sir Henry J. Lynch of Rio de Janeiro concerning his planting of *Worsleya rayneri*. His timely letters giving cultural suggestions, and some of the photos that he sent, are reproduced in part II, below. These will be of interest and help to all amaryllid enthusiasts.

II. The Use of the Blue Amaryllis, *Worsleya Rayneri*, in Landscape Gardening, by Sir Henry J. Lynch, Rio de Janeiro, Brasil

[THE FOLLOWING LETTERS WERE WRITTEN TO MRS. STROUT BY SIR HENRY, AND ARE REPRODUCED BECAUSE THEY GIVE CONCRETE INFORMATION ABOUT THE CULTURE OF THIS RARE PLANT.—EDITOR]

[February 25, 1950] The following account of my experience in the cultivation of the *Amaryllis procera* I hope will be of interest to you and to your Committee.

This plant as you of course know has been described as the "rare Blue Amaryllis sometimes called Empress of Brazil."

According to the Journal of the New York Botanical Garden for March 1941, page 65, it is said to grow in only one spot in the World, namely in the granite formation of which the Organ Mountains is composed. These form a part of the sea range of mountains (Serra do Mar) on the coast of Brazil between the South of the State of Pernambuco and the north of that of Rio Grande do Sul. They are given familiar local names. That part of the range called "Organs" because of its resemblance to organ pipes, is situated north of the Bay of Rio de Janeiro, in which are the summer resorts of Petropolis and Therezopolis.

The exact spot in the district where the *Amaryllis procera* grow is beyond the valley of "Retiro" (Seclusion) about 2 miles east of the center of the town of Petropolis and its limitation is said to be a line not more than one mile in length. The Valley varies in height of about 750 metres above sea level and the mountains forming the valley rise to an elevation of 1200 to 1500 metres. It is in the crevices high up the northern side of this spur that these *Amaryllis* grow in their native surroundings.

A friend of mine with his family went to live in this valley on the 4th July 1938. They are great garden flower lovers and are frequent visitors here. They happen to be with me now and have prompted me to write this account with which they are in agreement.

Shortly after residing in the valley a stray wanderer or orchid hunter brought down from the mountains above a few bulbs which my friend purchased for a small sum. On showing them to a nearby commercial horticulturist he identified them as the little known *Amaryllis procera* and gave my friends a description of their natural habitat. His description coincides in many respects with the articles on this plant since published in volumes 5, 6 and 7 of your journal Herbertia.

My friend gave me his bulbs and the chance acquaintance I thus made with this uncommon plant inspired me to experiment cultivating it in my gardens, beyond the town of Therezopolis at an altitude of 800 metres.

Although I have visited and passed the "Valley of Seclusion" twice a week with few exceptions during the last 12 years I have never had the desire to attempt climbing to the spot where the *Amaryllis procera* are said to grow.

Nevertheless on account of their rarity I endeavoured to find some

Worsleya rayneri (J. D. Hooker) Traub & Moldenke—portion of 30 meter bed facing n. n. w., showing how the BLUE AMARYLLIS grows on the estate of Sir Henry Lynch, Fazenda Bôa Fé, Therezopolis, Brasil.

Plate 19.

local inhabitant interested in procuring for me a quantity of bulbs. My interest was at a later date increased on reading your journal HERBERTIA.

It was not easy to find the desired person for none of the nursery gardeners possessed these plants and they all knew there was danger climbing these particular mountains, several lives having been lost in the venture. Following a long search I found one, a Syrian by birth who claimed to know all about the district and undertook to organize a group of companions to bring me a number of bulbs.

Fig. 24. *Worsleya rayneri*; showing another planting of the BLUE AMARYLLIS on the estate of Sir Henry Lynch, Fazenda Bôa Fé, Therezopolis, Brasil.

After a lot of bargaining I undertook to pay him quite a considerable sum of money in consideration of his delivering to me in his garden by a certain date not less than 600 (six hundred) mature bulbs.

This he faithfully did and on the appointed day I transferred from his lorry to mine 612 bulbs, all he was interested in collecting.

On being paid he grumbled at the sum agreed upon, alleging the venture had been more difficult than he and his companions had contemplated, but knowing this class of individual I was adamant and we parted the best of friends, with his promise to do anything I would ask of him except to return for more *Amaryllis procera* bulbs!

Well satisfied, I went on to my property where I proceeded to plant my treasures which weighed individually from 3 to 10 lbs. each. On arriving at my "Fazenda" 20 kilometres inland from the sea, I started to sort and arrange their positions in the beds prepared to receive them.

Of the six beds, four of them were 10 metres (33 feet) long by two metres broad, on an incline of 45 degrees facing N.N.E., a fifth was 14 metres long by one metre broad and the sixth 30 metres by 2½. These two are also on a slope at the same angle and face N.N.W. [Plate 19; Fig. 24] They all separate terraces of flower beds and lawns etc.

All the beds were made alike, that is to say the bottoms sloping at the degree mentioned are lined with solid granite flags drawn from my quarry, of various sizes from 6 to 18 inches across and one or two inches apart. On these flags the bulbs were placed upright at a suitable distance from each other, packed between each with pieces of granite rock and with plants that coexist with them brought from the mountains with the bulbs.

I have not sufficient technical knowledge to define the several varieties of plants brought with the bulbs and I am prepared to agree with Mr. Harry Blossfeld's classification on page 186 of HERBERTIA vol. 7.

Very little space was left for leaf compost and earth to fill in the remaining space, after a preliminary watering for a few days they were left to take care of themselves.

The slopes are slightly watered during spells of dry weather and the heavy dew that falls nightly here and in all the surrounding district seems to be sufficient for their needs.

Three of the four ten metre banks on which my bulbs were planted enjoy a full day's sunshine for there are no near trees to shade them and the only advantage shade may give is very scant and merely comes on to the bulb-roots from the intervening plants above mentioned. The fourth is shaded during the morning and the plants have not developed so well. The other two banks are slightly shaded during the first 2 hours of sunshine and appear to do as well as those with a full day's sun. There are a few bulbs in a quite different situation, similarly planted and do as well as those in the five beds.

During the 11½ years these plants have been thriving in my garden they have had a minimum of attention from my gardeners although I have personally watched their growth and habits.

Their flowering season is during the Brazilian Summer and my present season commenced with the first bloom appearing in November and some are still in bloom at the end of February.

This season a very large number perhaps more than usual, have produced from 4 to 9 flowers on each stem. These stems grow more than 29" in length from the center of the sickle leaves. My flowering plants measure 32 to 38 inches from the surface of the granite packing to the base of the flower stem. The sickle shaped leaves measure progressively from the central short ones to the outside longest ones 7 to 26 inches. Many of the plants continue to stand upright though others incline in different directions.

During the course of the year an excentric plant will give forth a

beautiful bunch of blooms and this may happen at any time outside their usual season which according to my friend's horticultural neighbour is the month of February.

A peculiar feature of the flower is that it should be called "blue" and described as Hyacinth blue.

Fig. 25. *Worsleya rayneri*, close-ups; as grown on the estate of Sir Henry Lynch, Fazenda Bôa Fé, Therezopolis, Brasil.

Mr. Harry Blossfeld on page 191 of HERBERTIA vol. 7 says of them "the color being a bright heaven blue with darker veins." It is curious that to the naked eye, as far as my blooms are concerned they vary from the hyacinth blue shown on page 124 of "Garden Flowers in Color" by G. A. Stevens, Macmillan Coy. 1937—to a darker hue approaching mauve. On the other hand when they are photographed on an "Anseo"

colour film in the brightest sunshine they have the blue colour of a tropical cloudless sky.

I have pleasure in sending you some snapshots taken in bright light without sun and also in the brightest sunlight. These will show you how different the colours are, the first when seen with the naked eye and the others through the camera lens reproduced on film and paper. [Fig. 25]

Many of my friends can testify to our never having seen the sky blue colour shown in some of the photographs and only the other colours above mentioned in a variety of shades.

The temperature in my locality during the course of the year varies very considerably. From midwinter—May to August—and midsummer —November to March—the difference may be as much as 55/60 degrees Fahr. in the shade. During the cold season in the early mornings the temperature will fall to under 40 (never freezing) and rise during the afternoon to 70/80. During the summer months falling to 50/60 and rising to 95 and 100 degrees, sometimes more.

The atmosphere is considered very dry as compared with the native home of these plants for they are never in any circumstances enveloped in cloud during the day and doubtful if even during the night. The rainfall during the summer is heavy whilst during the winter we have spells of dry weather.

As regards these plants growing from seeds I must confess to a certain doubt as to whether they do so to any extent. In my recollection I have only seen two seed pods during these 11½ years. The first at a very early date to which I paid no attention imagining there would be a yearly recurrence of many more. In this I was mistaken for the second one only appeared this year and unfortunately the stem broke off when still green having been eaten by a bug at its base.

On the other hand they reproduce quite intensively as off-shoots from a parent bulb. Some of my original bulbs have withered and disappeared leaving large famlies in their stead which spread in such a way that gives the impression they are growing from seed.

Another reason I have for doubting these plants grow from seeds is the fact that they are only known to grow in the particular spot aforementioned. Now the Organ mountains are all covered with fissures and crevices consequently one would think the winds and birds would carry the seeds to other parts but of this there is no evidence.

I have found some of my bulbs have been attacked by a bug said to be the maggot of a local white butterfly but I am not sure that is the origin of the particular bug.

One other thing. I have no definite evidence that the bulbs bloom more than once for I have never marked them. Judging from the large number of blooms I have had yearly during my 11 and half years' experience I would say they bloom freely for it is only the mature bulbs that give flowers and none of the offshoots in my gardens are approaching maturity.

I am writing from my week-end home the "Fazenda Bôa-Fé" and do not pretend to be more than a very amaturist gardener and landscape

architect on my 2500 acre property. I have tried to reproduce the natural habitat of native plants from observation and enquiry so I trust you will understand my not entering into a technical description of such a rare plant as the subject of this letter.

[March 17, 1950] Since writing you on the 25th February I have seen some correspondence between Major Pam and friends, from which I learn that the Blue Amaryllis, Empress of Brazil, to which my letter refers, has changed her name to *Worsleya Rayneri*. Due to this I inadvertently overlooked the articles on this plant published in vols. 10 and 11 of Herbertia under this new name.

I have now read Dr. Hamilton P. Traub's article in volme 10 with the greatest interest and I am glad to know of the successes at La Positas Nursery.

As I mentioned in my letter I am not at all technical, nevertheless his description of species corresponds very closely to my observations. Two minor differences nevertheless may interest you:

Leaves: I have just counted a large number of my bulbs and cannot find any mature ones with as few as 12 to 14. Mine are mostly 18 with a few 16 and 20.

Umbel: In my recollection I have never seen more than 9 blossoms on one plant, whereas he mentions 4 to 14.

Then turning to page 38 in volume 11, I note with particular interest that the same bulb does bloom more than once. I believed this to be so but had no proof.

Again there is some difference between the composition of the beds in La Positas and in my gardens. In the former they are said to be of decomposed granite. In their natural habitat this may be so but I had grave doubts and preferred to make my beds of hard granite blasted from my quarry. In any case it seems these bulbs will grow equally well in either hard or decomposed granite.

Another interesting line in this short article is that "Seedlings are proving difficult" and this would seem to bear out the opinion I expressed in my letter to you.

Whilst on the subject of seeds I would return to volume 10 and in particular to the illustrations on pages 87 and 88. There I see in quite a small number of plants at least three bearing fruit (presumably what I called a seed pod).

How different the experience in La Positas is to mine. Apart from never having seen in my large collection more than two bulbs bearing fruit I have only had one fruit on each.

In my letter, page 4, last paragraph but one, I mention (never freezing). This referred to in my gardens. In the natural habitat of this plant I am quite sure they suffer several degrees of frost every winter.

Trusting these further remarks may be of interest to you and your Committee.

xCRINUM CLONE CECIL HOUDYSHEL IN VIRGINIA

C. W. Culpepper, *Virginia*

The Crinums have many characteristics that make them very desirable as ornamentals. The luscious tropical foliage with its resistance to disease and to the temperatures and sun of warm climates, the freedom of the bulbs and the rootstock from disease, and the interesting variations in the flowers all make the group decidedly valuable in climates where they can be grown. They are warm climate plants but there are considerable differences among the different species in their resistance to cold. How well they can be wintered over outside in regions near the northern limits of their hardiness is not well worked out.

In 1942 Dr. Traub took up emergency rubber production research work in California When he left Beltsville, Maryland he intrusted to my care three mature sized bulbs of *xCrinum* clone Cecil Houdyshel. Each of these had one or more small offsets starting from near the base of the bulb. They were planted in a sandy loam of good fertility about 2.5 feet apart in a row in full sun at Arlington Va. I thought it would be worth while to see if they could be kept over winter outside in this locality. They grew well even the first summer and just after the first light frost killed the outer portion of the leaves a mulch of oak leaves and pampas grass was placed around and over the plants deeply enough to be assured that the bulbs would not freeze during the winter. As soon as danger of frost was over the following spring the mulch was removed and the plants examined. The bulbs were found to be sound with even eight or ten inches of the neck also quite alive. Most of the mulch material was removed; enough being left to conserve moisture and keep down weeds during the following summer. The soil about the plants was given a top dressing of a 5-10-5 fertilizer and little other attention was required until after the first light frost in the fall. During the summer the main bulb and the offsets grew vigorously and the main bulbs produced one or more flower stalks but it seemed that the display of flowers was altogether too small for the amount of foliage, but this was not true in later years. The same procedure was followed the second winter as the first, and so on until the present (1949). As the years passed the plants increased in vigor and in the luxuriance of the foliage. They have been entirely hardy with this treatment and the offsets have been produced so abundantly that the clumps have become very large. The bulbs at present are very crowded many of them with necks 18 inches to 2 feet in length. In 1949 there were more than 40 flowering stems which gave an excellent display of flowers over a period of several weeks, consequently the balance of foliage and flowers were not as much out of proportion as in the early years. As the clumps became larger the flowering stems increased in length and were 44 to 56 inches tall in 1949. In addition to their fine display in the garden the flowers are very useful for cutting.

Tests were not made to determine if the bulbs would survive the

winters without protection but the general appearance of the bulbs in the spring when the mulch was removed indicate that they would not survive unless planted very deeply. It is hoped that this may be tested out when the plants are taken up and the bulbs separated.

DAYLILY NOTES, 1949 & 1950

J. S. Cooley, *Maryland*

I. THE 1949 DAYLILY SEASON AT HOLLYHURST

Daylilies began blooming early in May this year, which is the usual time. Gold Dust was very floriferous. Some seasons this variety is disappointing because of the meager blooming but not this year. Also, the early mid-season varieties such as Flava, Chrome Orange and Queen Mary gave abundant blooms. The fact that these early and early mid-season varieties extend the blooming season is lost sight of by many people who are acquiring a number of varieties. In evaluating the early varieties, one should not try to compare them with those blooming at a different season of the year such as the fine mid-season varieties.

The mid-season varieties began blooming about June 16 and such late ones as Dorothy McDade about July 18. Berwyn began blooming about July 15.

The two early red seedlings of ours that showed promise other years were very poor this year, as long as the weather was cool. The color was disappointingly dull and muddy, but the flowers that opened after the advent of warm moist weather developed a normal good color. This is the first year we have grown Duncan. It bloomed at the same time as Victory Montevideo but Duncan was not so good this year.

We need to continue our quest for an early red. In this region, however, the weather is likely to be too cool for the development of a good red. Whether or not this limitation can be overcome remains to be seen. Our two early red seedlings that bloom about the time of Queen Mary indicate that an early red is possible. The seedlings produced by crossing a red variety on Buckeye were very disappointing. It looks as though some other line of attack will be more profitable. The effect of cool weather on red color in daylilies will probably be encountered in our quest for late reds. A red daylily blooming as late as *H. multiflora* would probably develop a poor quality of red color because of cool weather at the time of blooming.

It is interesting to note that during a period of unfavorable weather for the development of good red color in daylilies, some varieties are much less affected by the adverse conditions than others. Berwyn is a good example of a variety that has good quality of red color even during a cool spell of weather. It may be possible by persistent effort to incorporate this color quality into varieties blooming earlier and later than the very satisfactory mid-season varieties. The accomplishment of

this will mark another step in the development and extension of the use of this fine group of plants.

II. THE 1950 DAYLILY SEASON AT HOLLYHURST

The winter here was very mild, but the spring was much cooler than usual. The late spring delayed blooming considerably. GOLD DUST bloomed later and much more freely than APRICOT. The idea is held by some that the irregular and often sparse blooming of certain early varieties, such as APRICOT, is due to insufficient cold during the winter to break dormancy. Our observations point to the conclusion that there are a number of contributing factors and if insufficient cold is concerned, it is only one of a number of factors entering into the complex.

Hemerocallis flava was unusually free blooming this year. This species blooms at the same time as bearded iris and therefore makes a very beautiful supplement to the iris colors of blues and purples. It is strange that more gardeners do not make use of the early varieties such as *H. flava*. As the blooming of *flava* is passing CHROME ORANGE begins. This variety is in the early mid-season class blooming along with QUEEN OF MAY, QUEEN MARY, SEMPERFLORENS, and SUN GOLD. Sometimes some of the early mid season varieties give very sparse bloom—maybe due to cold injury to the bud primordia. CHROME ORANGE, however, has been very dependable year after year. Sometimes the weather is such that some days the blooms burn but in general this variety is a splendid garden flower. It is a free bloomer, it has large flowers of good finish and texture. *It is the only variety the great naturalist, the late Theodore L. Mead, introduced and is a tribute to the good judgment of the introducer.* Moist warm weather in the latter part of June and early July was very favorable for daylily bloom. The richness of color in the mid-season daylilies was especially fine this year. A few warm bright days the latter part of June following moist and cool weather resulted in severe burning of many varieties of daylilies. Early in July the weather was moist and warm with only a moderate amount of sunshine. During this period when many of the mid-season varieties were in bloom the colors were very rich and beautiful. Such varieties as SAN JUAN, MAYOR STARZYNSKI, LIDICE, DR. STOUT, J. A. CRAWFORD, PATRICIA, CORLISS, CABALLERO and many others were very beautiful. That is to say the weather was favorable for beautiful flowers on all the color types, the reds, the yellows, and the pastel blended shades.

The extensive activity in the breeding of daylilies at the present time will undoubtedly work for the ultimate improvement of this fine garden flower. It is to be hoped that the best of the enormous number of introductions will be preserved for posterity. The outstandingly good new varieties would probably be less likely to be lost to the world if there were fewer introductions. That is to say, if each breeder would use all the restraint possible to introduce only those that are better than what we already have, it would tend to keep down the number of new varieties to be appraised. Even if a variety is only slightly superior to one we already have its introduction should make for some slight progress. We

are probably too close to the changing conditions in the varieties of daylilies to appreciate that fact fully. It is no doubt true that the outstandingly good varieties will come to the top under any conditions and be preserved. This is probably a time when one will have to exercise a great deal of forbearance and not decide to quit getting any new ones just because one expensive variety we purchased was inferior to those we already had.

THE 1950 DAFFODIL SEASON

Grant E. Mitsch, *Chairman,*
Narcissus Committee, Canby, Oregon

For the past two years we have been telling of abnormally late cold seasons but the current season has been one to make us forget previous winters in the point of severity. The freezing temperatures did not hold on so long without a break as in 1949, but we witnessed the coldest weather of our twenty-five years spent in Oregon. Aside from fact that it did not last as long, there was one other redeeming feature in this winter's performance:—the ground was covered with snow most of the time.

Quite dry and pleasant weather prevailed through autumn and the early part of the winter, but with the advent of the new year, winter arrived with a vengeance. New Year's Day brought about two inches of snow and the thermometer dropped to 16° F. A day or two later there was a regular blizzard. Most of the snow melted by the 5th of the month and there followed several days of intermittent snow and rain. Rains coupled with freezing temperature were frequent and highways became so glazed with ice that travel was hazardous. The trees and shrubs were beautiful to behold with their jeweled raiment until the load became so heavy that branches started breaking. Fortunately the ice soon melted, but there soon followed brisk biting northeast winds bringing a cold air mass in from Canada with more snow accompanying. Most of the snow melted a few days later but the respite was of very brief duration as cold winds brought more and the temperature dropped to about 5° F. below zero January 31st, a record to be matched three days later. In another four days I dug a bulb of *Narcissus minimus* from the garden and potted it. The next day it had a bloom open! It is a marvel how these spritely little flowers can take such adverse weather! Yet, were it not for the snow it would perhaps have succumbed.

Many thousands of Camellias and Rhododendrons were killed down to the snow level besides many more being killed outright. Many other comparatively tender shrubs and trees suffered a like fate. Much of the fruit crop was destroyed or damaged. But the snow did protect the field crops such as grain and hay, and it prevented the soil from being frozen more than at the very surface, allowing the roots of bulbs to continue functioning. Thus, in spite of the severe winter, we had February

GOLD in bloom by February 25th, the first time in three years that it had lived up to its name.

MITE and a MAGNIFICENCE x *N. cyclamineus* seedling were again among the very first flowers to bloom, but by March 4th we were able to cut a nice lot of ROUGE and BRUNSWICK. These should be two fine market flowers in the future, as in addition to being early, they are high quality flowers. ROUGE is a flower of nice form and bright coloring and the unusual yellow perianth suffused with pinkish buff gives it distinction. For some years we have been carrying on a DAMSON x FORTUNE seedling which is very early blooming and has a large cup of most intense chrome orange. Its perianth is not as flat and smooth as we would like and the flower tends to face down a bit too much, but because of its brilliance, size, and prolific blooming we enjoy it very much for early cut flowers.

While the Daffodils started blooming earlier than a year ago, the weather remained cool and damp and after the first early flowers opened, other things were very slow coming out until the last week in March. Even then, it rained nearly every day until the late varieties were opening, making it difficult to do any pollenizing. The cool damp weather was quite ideal for the red cups and never have I seen finer blooms of some of these. BAIRAM was magnificent with its large very smooth rich yellow perianths and blazing solid orange red cups. It is giving some very nice seedlings. Crossed with a seedling of CHEERIO x MARKET MERRY which we have named ARDOUR, it gave numbers of smooth flowers with brilliant red cups. ARDOUR crossed with other things has given very nice flowers and we used its pollen quite extensively this year. This flower first bloomed five or six years ago in a lot consisting of only three or four bulbs, I believe, and being about the best red cup we had bred up to that time, the same cross was repeated both ways on a much larger scale but nothing of much merit has appeared in the resulting seedlings. Unfortunately, the cup of ARDOUR is quite susceptible to burning in sun or wind, but because of the substance of the large broad flat perianth, and the brilliance in coloring, it appears to have value in breeding. We will eagerly anticipate the results of a group of seedlings from it crossed with SUN CHARIOT. A series from DIOLITE x CARBINEER gave a goodly number of very smooth large well formed flowers; most of these had red rimmed cups with a few solid orange red crowns.

KRAKATOA was quite sensational this year and a group of blooms picked for the Tacoma show furnished a spectacular focal point for the exhibit. NARVIK as usual was splendid and it appears to be one of the most promising of all the red cups either for exhibition or commercial use. It is not a large flower. We have never seen larger nor more brilliant blooms of ROYAL MAIL, GARLAND, DUNKELD, TAMINO, CHUNGKING, and INDIAN SUMMER were all very fine.

There is still nothing to beat GALWAY for an all yellow Daffodil. Of the trumpet varieties, KINGSCOURT is about the best but MILANION is very good and so is the entirely different very early blooming FRONTIER. We had some splendid yellows from CAMBERWELL KING x MORTLAKE, and one of the finest we have ever seen came from KING OF THE NORTH x CONTENT, a flower built on the lines of KINGSCOURT but larger and with a flatter perianth. This same cross gives many of those unusual

greenish lemon or sulphur colored flowers and an occasional reversed bicolor. Mr. Wilson's MOONSTRUCK and SPELLBINDER came from these parents and we have had numerous flowers of this type. HUNTER'S MOON x CONTENT, and KANDAHAR x CONTENT have given similar flowers and almost white but still possessing a little of the cool color tones found in CONTENT came from this variety crossed on CANTATRICE. CONTENT pollen used on GODOLPHIN, POLINDRA, and BINKIE yielded several interesting flowers. We consider BINKIE one of the most desirable flowers for cutting, its beautiful form and unique cool coloring making it a most charming subject for vases.

WHITE DAFFODILS have always been favorites with us and we always thrill to the chaste beauty of TRUTH, ZERO, and CANTATRICE which are among the first to bloom of the large pure whites. COOLIN has been exceptionally fine the last two years. LUDLOW is unsurpassed for beautiful form, quality, and purity. None of these are quite as spectacular as KANCHENJUNGA with its enormous heavily frilled trumpet, or the giant tall BROUGHSHANE, both of which appeal to visitors more than any other named whites we grow. A seedling from KANCHENJUNGA x ADA FINCH was most striking, being a very large clean pure white flower on a tall stem. Several blooming for the first time from KILLALOE x BROUGHSHANE looked very promising and should prove worth while when grown from full size bulbs. Perhaps the biggest Daffodil we have ever seen came from KANDAHAR x ADA FINCH; a very coarse flower but one which makes quite a garden display. On the other hand, for perfection of form and balance, there is nothing more beautiful than CHINESE WHITE, and it is already proving a good parent. From a group of seedlings of this and GREEN ISLAND crossed both ways we had several most beautiful flat crowned flowers of lovely form bloom, and curiously, there were two or three pink toned flowers among them.

CHINESE WHITE is only one of the good Daffodils in its class; we still think most highly of FOGGY DEW, TINSEL, SYLVIA O'NEILL, and GLENSHANE. Apparently they all furnish good breeding material, for while we have not bloomed many seedlings from any but SYLVIA O'NEILL, some nice flowers have appeared. From a lot of RUBRA x SYLVIA O'NEILL we selected a number of interesting things when they started blooming in their fourth year, several more were taken out the following season, and this, their sixth year, we picked about half the blooms from the remaining bulbs, any one of which was quite the equal of its parents and all with beautiful cups varying from pure white to some edged with lemon, gold, and orange salmon, in some cases there being but a narrow picotee edging, and others with a broad band of color. From ALBERNI BEAUTY x SYLVIA O'NEILL came several beautiful flowers, one being a larger more striking flower than SYLVIA O'NEILL. ANGELINE x SYLVIA O'NEILL produced a number of very delicately marked flowers. From CUSHENDALL x CANTABILE there were numbers of beautiful green eyed flowers, one having a perianth so rounded and broad that the inner segments touched.

Pink tinted flowers are intriguing to most Daffodil fanciers and while we do not grow nearly all the varieties in this color class, we have

quite a number of them. There is still room for much improvement, not only to increase color intensity and better the form of the flowers, but to stabilize the coloring already present. Weather conditions have much to do with color but what affects one variety may not another. During 1949 when we had clear sunshiny weather during most of the blooming season, DAWNGLOW, ROSARIO, and the old MRS. BACKHOUSE had about as fine coloring as I had ever seen while WILD ROSE and some of our seedlings were more deficient in color than any other time in our experience. This year with continuous damp weather, the first three had less color than last year whereas WILD ROSE, LISBREEN, LOUGH MAREE, INTERIM, and others had much better. MABEL TAYLOR had good coloring both years but I think somewhat less than some other seasons. A small flowered seedling from (WHITE SENTINEL x MRS. R. O. BACKHOUSE) x WILD ROSE which came with intense rosy pink coloring two years ago and was very pale last year returned with its original coloring again this season. SHIRLEY WYNESS has comparatively little color at best but has proven a good parent. Crossed with PINK A'DELL it gave numbers of flowers with good form, the crowns being nicely frilled and several with quite good shell pink coloring, one being the best pink we had during 1949, the color being quite uniform throughout the trumpet-like crown. TUNIS x SHADEEN gave numbers of well formed tall-stemmed flowers with just a suggestion of pinkness, but one flower was of good size with the entire crown a rich deep salmon pink which lasted well. From PINK LADY x SHOT TOWER came several well colored flowers with rather unusual bell shaped crowns. EVENING crossed with MABEL TAYLOR and MRS. BACKHOUSE gave flowers of nice form and several with good coloring. Most of them were rather small but they may increase in size when bloomed from mature bulbs. A large series from SHIRLEY WYNESS x MABEL TAYLOR started blooming in their fourth year and practically all that opened had more or less color; the first time we could look down a row of unselected seedlings and see nearly all the flowers with pink coloring Most of these leave much to be desired but there were several which showed promise and nearly all had attractively frilled crowns. One flower from this cross looked much like a smaller JOHN EVELYN with a pink crown. From WILD ROSE x BROUGHSHANE came several quite large flowers with pale pink coloring which should prove useful for further breeding. Perhaps the most startling flower to appear in a pink cross this year came from INTERIM x MABEL TAYLOR. Even though from a small bulb, it gave quite a good sized flower of very nice form, having flat smooth perianth and a medium sized crown, rather long, with about a half inch band of intense coloring that might be described as rich salmon rose with a copper suffusion. This was not a large series but nearly all the flowers that bloomed from this cross were interesting as to form and coloring. We look forward to seeing these and others from the same cross which did not bloom including a larger lot from the same pedigree. The first comparatively good pink we had come from WHITE SENTINEL x MRS. R. O. BACKHOUSE. This seedling crossed with INTERIM produced a lot of only about half a dozen bulbs of which three or four bloomed this year. The best was a flower with white perianth and white crown with a band of quite clear pink about half its length; an inter-

esting thing in contrast to others which have yellow, primrose, or cream as their basic color. KENMARE has never given enough color here to really warrant being called a pink, but combined with MABEL TAYLOR it gives good sized flowers with salmon pink crowns.

With bi-color flowers other than the pinks and yellow-reds we have done less hybridizing—although we have some of the best named varieties. PREAMBLE looks like the best bi-color trumpet yet to appear although those with less contrast in coloring contain noteworthy representatives in SPITZBERGEN and TROUSSEAU. Of the large cupped varieties, BODILLY and POLINDRA are still difficult to surpass. We were much impressed with SEBASTOPOL this year. Of the larger red cups KILWORTH and FERMOY are outstanding and of the small cupped Daffodils, there are a number that are very good, among which LIMERICK and BRAVURA rate at the top.

While we had rather bad weather during the blooming season and could not accomplish much either in hybridizing or taking notes as we would wish, it has not been a bad season at that!

NARCISSUS NOTES 1950

J. S. COOLEY, *Maryland*

As the years come and go each growing season seems to bring to mind the influence of weather conditions on some plant in which we are especially interested. If one is disposed to try to interpret the effect of these environmental influences on the health and vigor and productiveness of certain plants, *Narcissus* for instance, he usually has plenty puzzling things to try to account for. The past year, with the mild winter and cold spring, was a good example of such a set of conditions. The leaves of some varieties emerged as early as December. The weather continued mild in December, January and February and the early varieties had bloom scapes well formed early in March. The weather changed suddenly to the cold side about March 15. When the early varieties were nearly in full bloom the thermometer registered 22° to 25° F. for a number of nights. For about a month cool weather prevailed with temperatures often below freezing. This cool weather undoubtedly had its effect upon narcissus blooming. However the complexity of such a situation is so great it is difficult to evaluate properly the different causal factors. Among the earliest bloomers there was a great variation in tolerance for weather that was freezing or below. FEBRUARY GOLD showed greater tolerance of the cold than any other variety blooming at that time. In fact it was surprising to see the flowers and scapes frozen stiff in the morning and yet recover when the temperature rose later in the day. The varieties THE FIRST and MALVERN GOLD were decidedly affected by the cold. Some of the buds on THE FIRST blasted and others did not unfold properly. THE FIRST as well as some other varieties gave a very poor yield of blooms. This makes one wonder whether or not some of the bud primordia were frozen to death before they emerged. If this condi-

tion obtained in the case of THE FIRST it may help to account for the poor yield of flowers of many varieties this year.

Another aspect of the cold was poor unfolding and development of flowers. Some varieties did not unfold their flowers completely thus remaining funnel form instead of wide open with flat perianths. Another effect of chilling was a crinkling of the flower. This was particularly true of GOLDEN SCEPTRE and also some other Jonquilla hybrids. The flowers of some of the Jonquilla hybrids also failed to make the necessary development after the buds opened, thus making a short crinkly flower. On the other hand the orange cupped varieties, such as FORTUNE and RED CROSS, were unusually beautiful with their rich glowing orange cups. These as well as other orange cup varieties often fail to produce orange cup flowers—only a yellow.

In spite of the effect of the weather on certain Jonquilla hybrids, their general effect was good and it was surprising and gratifying to note how many visitors were attracted to the intimate beauty of the little Jonquillas. They realized the potentialities of this group as a garden flower or a cut flower for small arrangements. As the beauty and dependability of the Jonquillas becomes known it is possible that increased interest will develop in this group. It is true that some persons saw only the giants, such as ADVANCE GUARD, GOLDEN HARVEST, STRESSA, and the like.

Another effect of the cold was a browning of the tips of the leaves, resembling the effect of basal rot, but on examining the roots no basal rot was found, The symptoms indicated that the cold injured the tips of the leaves and the browning and death of the injured parts took place some time after the injury occurred.

As a group, *Narcissus* still lacks the popularity it merits both as a garden flower and as a cut flower. With the great advance that the breeders have made with this flower in recent years it does seem strange that it is not more generally used by the home gardeners and flower lovers.

Conditions this year were very unfavorable in this region for the setting of seed. Some seasons are unfavorable for pollination because of warm weather, but this year when the temperature was below freezing so many nights after the blooming started, it apparently was too cold for fecundation to take place. My pollination of early varieties gave practically no seed. A few of the later varieties which bloomed after the weather was somewhat warmer set a little seed.

The cold moist spring has been very favorable for leaf development. The tall and vigorous plants this year should be producing fine bulbs and therefore we should expect fine flowers next year.

It may not be amiss to mention here some of the varieties that were good and also some that were not good. FEBRUARY GOLD, GOLDEN HARVEST, BEERSHEBA, FORTUNE, DAWSON CITY, TRIVITHIAN, MRS. BREWSTER, LOVENEST, ALCIDA, LUCINIUS, HERA, HORACE, and ACTAEA were good, while WHITELEY GEM, THE FIRST and MALVERN GOLD were injured by the cold.

EVALUATION OF DAYLILIES IN MISSOURI

GEORGE E. LENINGTON, *Missouri*

For the past several years, visitors to the Lenington Display Garden [Fig. 26], in Kansas City, Missouri, have voted for the *Hemerocal-*

Fig. 26. Portions of Lenington *xHemerocallis* Trial Garden, Kansas City, Missouri —(Upper left, and right; and lower left) Mid-June, 1949; view in upper left, looking toward K. C. Life Ins. Co., apt. house and office bldg.; (lower right), taken Oct. 4, 1948, showing Mr. Lenington, and second bloom scape of CERISE.

lis they considered best. At the end of each season, tabulation of the votes gave interesting information yet it seemed evident that the visitors

were voting for the varieties they had in their own gardens, or the ones with which they were the most familiar, rather than for those with improved form, color or substance. For that reason, in the spring of 1949 the name-stakes were replaced with numbered stakes and the visitors made their selections by number instead of by name. (A printed list of the variety names and numbers was given each visitor AFTER he made his selections.)

As expected, tabulation at the end of the season (1949) revealed that the old favorites had been replaced by newer and better hybrids. For example, the top 15 varieties were as follows: 1. Painted Lady, 2. Naranja, 3. Camelot, 4. Constance, 5. Honey Red Head, 6. Scarlet Sunset, 7. Wekina, 8. Black Hills, 9. Felicity, 10. Capt. Blood, 11. Mrs. Hugh Johnson, 12. Flame Fagot, 13. Ruby Supreme, 14. Majestic, 15. Cerise.

The same procedure was followed again during the 1950 season. Of the 234 varieties in the display garden, the following were the most popular:

Early—1. Flavinia, 2. Judge Orr, 3. Elizabeth.

Intermediate—1. Queen of Gonzales, 2. Duncan, 3. Caprice.

Summer blooming—1. Crimson Star, 2. Garnet Robe, 3. Naranja, 4. Pink Bowknot, 5. Windsor Tan, 6. Constance, 7. Majestic, 8. Revolute, 9. Brocade, 10. Knighthood, 11. Painted Lady, 12. Patricia, 13. Comet, 14. Brackel, 15. The Champ, 16. Ta Ming, 17. Silver Stars, 18. Capt. Blood, 19. Side Show, 20. Rudbeckia, 21. Pygmalion, 22. Mrs. B. F. Bonner, 23. Marionette, 24, Ming Toy, 25 North Star, 26. Bicolor, 27. Hesperus, 28. Ballet Girl, 29. Midwest Majesty, 30. Bold Beauty, 31. Orange Beauty, 32. July Apricot, 33. Scarlet Sunset, 34. Duchess of Windsor, 35. Haile Selassie, 36. Black Prince, 37. San Juan, 38. Black Hills, 39. Betty Slick, 40. Dr. Slaughter, 41. The Director, 42. Golden Giant, 43. Ophir, 44. Wekiwa, 45. Amherst, 46. Artemis, 47. Colonial Dame, 48. Fair Alice, 49. Marco Polo, 50 Plum Mist.

Late—1. Martie Everest, 2. Autumn Prince, 3. Bright Eye.

Nearly two dozen varieties failed to receive a single vote—even though the garden was host to more than 600 visitors—so they will be replaced by varieties that have been growing in the small garden. In addition, 26 others will be added, making a total of 260 to be seen by the 1951 visitors. The new introductions, which are being received this fall, will be planted in the small garden—to become replacements in 1951 and 1952.

Anyone wishing to visit the display garden is cordially invited to do so. Located in the heart of Kansas City, Missouri at 3535 Penn., on the grounds of the Kansas City Life Insurance Co., it is easily reached by all means of transportation.

AN AMARYLLIS BIRTHDAY CAKE

Mary G. Henry, *Pennsylvania*

This year as usual I rejoiced in a happy family gathering on my birthday with most of my children and 11 grandchildren at the evening meal.

Fig. 27. Henry Birthday Cake; featuring the new *xAmaryllis gladwynensis*. Photo by M. G. Henry.

My joy was quite complete when my "birthday cake" appeared.

Almost as lifelike as if just laid on the cake was a gorgeous replica, in full and well-matched color, of *xAmaryllis gladwynensis!* [Fig. 27] The flowers were the same perfectly marvelous carmine and the bulb of chocolate completed the picture. It was made and decorated by my daughter Josephine.

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GLORIOSA LILY EDITION

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PREFACE

The 1950 GENERAL EDITION features an important article by Mr. Hayward on the GLORIOSA LILIES. Mr. Hayward has made a special study of this genus and he shares his findings with the readers. He is also well versed in the culture of this fine group and passes this information along also.

There are other interesting articles in this issue—Mrs. Henry writes about an interesting western trip in 1950; Mr. Allgeyer writes on plant growing experiences; a quotation from the late Henry Nehrling is reprinted; and a note on cytological mountants is included for those who wish to study chromosomes in plants.

December 10, 1950

Hamilton P. Traub
Harold N. Moldenke

FLORIDA—LAND OF FLOWERS

"The late afternoon hours of spring, summer and autumn in Florida have an indescribable charm, a charm peculiarly their own, and the early morning hours are scarcely less enchanting. This is the time to enjoy nature, to enjoy our gardens and flowers. In the evening glow or very early in the morning, I am fond of wandering through my *Amaryllis* and *Caladium* gardens to meditate on the ineffable glory of nature, to think of my ideals and of all that makes life beautiful. How charming is this Florida evening glow as it falls on the brilliant blossoms of the *Amaryllis* or on the georgeous leaves of the Caladiums! In the cedars nearby the cardinal sings in jubilant notes its evening hymn, the mockingbird pours forth its unrivaled melodies from the top of an orange tree, and the loud whistling calls of the chuck-will's widow resound from the thickets of near woodlands. It is twilight. The air is wonderfully soft and salubrious, and the bright stars appear, and shine as they only can shine in Florida—the land of flowers, the land of my ideals in horticulture."—*Henry Nehrling* (in Proc. Florida State Horticultural Society, 1908)

THE GLORIOSA LILIES

WYNDHAM HAYWARD, *Florida*

The GLORIOSA LILY, at least in the species *Gloriosa rothschildiana*, is rapidly assuming an important place in the sun of cut flower horticulture both in the United States and Europe. Its place in the garden also looms ever larger.

The species *Gloriosa rothschildiana* [Fig. 28] is one of the newest of horticultural favorites, viewing it from the longer perspective. It was first described in 1903 in the (English) Gardeners' Chronicle by James O'Brien, gardener to the Hon. Walter Rothschild, M. P., following its coming into flower at the Rothschild estate, Tring Park, Tring, England.

Its discovery by Maj. H. B. Rattray, in the Uganda district of East Africa may safely be described as one of the high points in modern garden and plant exploration annals. Shortly after its first flowering in England it was illustrated and described in a number of European garden papers, and proved a sensation when shown at various flower shows. O'Brien soon sent tubers to his fellow plantsman and pioneer Florida horticulturist, the late Henry Nehrling, at Gotha, Fla., who found the plant admirably adapted to ordinary garden culture in Florida.

From these first few tubers have come the thousands that are now being grown by commercial growers and dirt gardeners all over the world. In Holland, the firm of C. G. Van Tubergen, as reported in a recent number of the Royal Horticultural Society Journal, cuts an important crop of commercial cut flowers from the *Gloriosa* bulbs blooming in its greenhouses.

At least one nursery in California grows the tubers under glass for the production of flowers for the Los Angeles market. In Florida three or four growers mainly in the central part of the state where the bulb seems particularly adapted, grow the *Gloriosa* by the thousands for the sale of both cut flowers and tubers.

The *Gloriosa* is a popularly fascinating and scientifically interesting subject, which accounts for its rapidly increasing vogue in the recent 20th century since the bulbs have become available in larger quantities. The first species known to horticulture was *G. superba*, known to pre-Linnaean writers, as Herrmann, under the name of *Methonica malabarorum*. Linnaeus gave it the generic name *Gloriosa*, and so it has remained despite the efforts of botanists to refer the genus back to *Methonica* as late as the mid-19th century.

According to the Botanical Magazine, which has a plate of this beautiful subject as No. 77, "the extravagance of the present generic name, its being accompanied by a specific one little less exaggerated, its being an adjective, and more worthy of the whim of a Dutch Florist than of the taste of Linnaeus, have provoked several attempts to get rid of it for that of *Methonica*, an appellation the plant is known by in Malabar." (1810)

Its unusual name, it must be admitted, well signifies the realization

of the early plant workers of its exceptional beauty and the exotic qualities of its coloring and form. Freely translated it might be referred to "The Superb Glory Lily," which is certainly "painting the lily," but admittedly deserving in the case of the *Gloriosa*.

The genus *Gloriosa* is a small one, between 10 and 15 species being known today, and of these only four or five are known in gardens. Only recently have some garden hybrids been reported in Florida by Jules Colle of Fern Park. The species grown in the United States include *G. superba* [Fig. 29, A], *G. rothschildiana* [Fig. 28], *G. carsoni* and *G. plantii* (*viriscens*) [Fig. 29, B] besides a remarkable yellow-flowered type with claret shadings introduced into Florida lately from Trinidad gardens by Mrs. Wilhelmina Greene, the well known wild flower and tropical plant artist. It is now being grown by Mrs. Green and Ralph W. Wheeler in Winter Park, Fla., and may prove to be a form of the previously described *G. rothschildiana* var. *citrina*, (Gardeners Chronicle July 22 and Sept. 16, 1905). It is one of the most remarkably attractive forms of the genus. Recently *G. verschuuri* has been named in Holland. It is near *G. rothschildiana*.

The genus *Gloriosa* consists of climbing bulb vines, most closely related to *Littonia* and *Sandersonia* of the *Liliaceae*. They have tubers and remarkable curling tendrils on the tips of the leaves by which they are widely known, and with which they climb and cling for support. These "claspers" as they were known in the old botany works, "foliis cirrhiferis" Linnaeus stated in the Species Plantarum, 1753, hold firmly to any twig or stem to which they attach themselves, and are so strong that usually the leaf will tear before the tendril will pull loose.

Various species grow to different heights. Under glass they may be many feet tall when grown in part shade and with heavy manuring. Large size tubers will also produce remarkably long, strong vines under some conditions for all species. Large tubers of *G. superba* may produce a vine of eight to 10 feet in height, in Florida, sometimes more than that. *G. rothschildiana* when grown in the strong sun is usually three to six feet tall, depending on the soil, moisture, and size of the tuber.

The flowers of *G. superba* are much twisted and crisped with six recurved or reflexed petals, opening first a greenish yellow and turning to red and yellow as the flower expands. When near maturity the flower deepens in color, turning orange red and later darker red in shade.

There is an interesting type which may be *G. superba* var. *lutea*, (possibly the same as the *Gloriosa virescens* var. *grandiflora* shown in Gardening Illustrated, Nov. 11, 1905) found with the common *G. superba* in Florida commercial collections. It opens a rich citron yellow and turns tawny red gradually as the flower matures and fades. It is a beautiful thing, as the light golden color holds after picking at the right stage. It is being propagated too increase the stock.

Gloriosa rothschildiana has wider foliage than *G. superba*, shorter, stockier stems, stronger tendrils, and larger, showier scarlet and yellow flowers, which expand, recurve and deepen in color as the flower matures, turning crimson-lake at the last. The best blooms may be six or more inches in diameter. There is a great variation among seedling-grown

stock as to the length and width of the petals, and the amount of the crisping or undulation of the segments. The best specimens are regarded as being those with the broader segments and less of the crisping.

Henry Nehrling reported hybrids of *G. superba* and *G. rothschildiana* in his horticultural writings in Florida, and some of the smaller types among *G. rothschildiana* seedlings with narrower, more crisped segments may have some of this hybridity in their ancestry, as all *G.*

Fig. 28. *Gloriosa Rothschildiana* O'Brien. Photo by Wyndham Hayward.

florida stock of the *G. rothschildiana* until recent years is believed to be derived from the few bulbs Nehrling received more than 45 years ago from O'Brien in England.

Since World War II, *Gloriosa rothschildiana* bulbs have been imported for comparison and commercial purposes by American growers from Holland and India. Some conscientious plant exploration to determine more facts about the plant in its native habitat, including pos-

sible natural variations appears a highly pressing need today.

Gloriosa carsoni was first described by J. G. Baker in the Kew Bulletin, 1895. It was recently introduced into the United States (1949) by R. S. Cammack of Maitland, Fla., and the writer. Bulbs are being grown in England and Holland at this time. The plant is from East Central Africa. *G. carsoni* has more the tall, free, branching habit of *G. superba*, with more obtuse leaves and 20 or more flowers on a large plant. The flower has more the shape of the *G. rothschildiana*, but is smaller, light yellow and claret-brown in shade, not spectacular, but a handsome tropical vining subject. The tubers are similar to those of *G. superba* and *G. rothschildiana*, which are L or V-Shaped, in normal specimens. Small bulbs are sometimes curved or round or even nearly straight, in these three species.

Gloriosa plantii has orange and yellow flowers, opening at first a pale yellow-green, which is believed to have been the reason for the original name of the species, *G. virescens*. In America and England it has been popularly known as *G. plantii*. The vine is more dwarf than in the case of the other *Gloriosa* species, the leaves more lushly green and glossy, with two branches in the case of most mature specimens. There may be a large number of flowers and they are similar to *G. rothschildiana* in shape, bright and attractive in their coloring, and very useful in the background of the garden, where they can be induced to grow on stakes or wires to a height of two or three feet, with sideways branching. The tubers of *G. plantii* are the most remarkable of the genus yet observed, long and slender, flexible, yet brittle and difficult to dig without breaking. They run under the ground in all directions sometimes curving around into a complete loop and continuing on several inches more. They usually are of pencil thickness or slightly larger and up to two feet in length. They are almost never of the formal V or L shape of the other species.

Gloriosa virescens was first described in 1825 as plate 2539 of the Botanical Magazine, based on a plant obtained from Mozambique in East Africa. It appears to be the most widely distributed of the *Gloriosa* species in Africa. The name *virescens*, meaning greenish-flowered, is usually ascribed to the fact that flowers of this *Gloriosa* are notably lighter-colored when grown under glass. In other words, it is likely that *G. virescens* is the same plant as that grown today as *G. plantii*, which is light yellow-tan when first opened even under lath house conditions. Since this identity remains somewhat in doubt it has been thought best to retain the name *plantii* in this article on a temporary basis.

The genus *Gloriosa* contains its mystery, the second recorded species, *G. simplex*, which for years was accepted as a synonym of *G. virescens* and *plantii* (see Bailey: Standard Cyclopaedia of Horticulture under *Gloriosa*. Also Kew Index, Main Volume, page 1035.) This in spite of the previously published statement that *G. simplex* had blue flowers, and there is no hint of possibility that *G. virescens* had blue flowers at any stage.

Linnaeus published the species *G. simplex* in a rare work known as Mantissa, page 62, in the 1760's. He described it as having acuminate

leaves, with no clinging terminal tendrils. For this reason he named it simplex. He based the species on an account of "Gloriosa coerulea" in Miller's (Gardening) Dictionary, and mentions "habitat in Senegal. folia non cirrhosa, flores coerulei": (habitat in Senegal, leaves without claspers and flowers blue.) Linnaeus indicates that he never saw the plant alive himself.

Fig. 29. A, *Gloriosa superba* var. *lutea*, at the yellow phase; and B, *Gloriosa plantii (virescens)*. Photos by Wyndham Hayward.

Reference to Miller's Dictionary in the proper edition reveals the interesting information that seeds of "G. coerulea" were sent to England from France by the gardener to the French King at the Trianon in Paris, M. Richard, and were brought to Paris by M. Adanson from Senegal, ("who discovered the plant growing there naturally.")

"This is said to have a blue flower" relates Miller, "but the plants which are in the Chelsea garden have not yet flowered. This hath a climbing stalk, which is garnished with smooth leaves about three inches long and two broad, ending in acute points, but have no tendril or clasper." Further he adds that the "stalks as yet have not grown more than two feet high, but have the appearance of climbing like the other sort." (*G. superba.*)

"The leaves," Miller adds, have a strong disagreeable scent on being handled, so as to be troublesome to the head if too near, or long smelt to." (!) from the statements in Miller's account of this mysterious *Gloriosa* species, namely; blue flowers, and disagreeable scent of the leaves when crushed, it seems hardly likely that Adanson's plant was a true *Gloriosa* as now known. No further account of the plant has been found in the literature, with reference to the question whether on flowering it proved to be a genuine *Gloriosa* with blue flowers! The name *G. simplex* remains therefore under a cloud of uncertainty, with no just reason for its application to *G. virescens* or *G. plantii.*

The first bulbs of *G. plantii* are reported to have been sent to England by R. W. Plant from Natal, in 1851, and the subject was consequently described as *G. plantii.* Later it was referred to *G. virescens* as a variety. The species *G. virescens* remains the most variable of the Gloriosas, and *Methonica grandiflora*, Bot. Mag. 5216 is usually referred to it as a variety.

Propagation of *Gloriosa* plants is by seed, and division of the tubers or natural increase by both means. All the species except *G. rothschildiana* seed readily in nature, and this seed, after the proper ripening period, can be grown into little tubers in another season. Two or three seasons will be necessary under ordinary conditions to produce large blooming size bulbs. Tubers of *G. rothschildiana* may grow to a foot long and reach the thickness of one's wrist. Seed of this species is produced more readily by inter-clonal pollination.

In commercial practice, the tubers are broken at the angle, the large arm sold and the smaller arm retained for planting stock. The usual commercial size of *G. rothschildiana* tubers is the thickness of one's little finger and larger, and four to six inches long. The growth of this species has a similarity to that of gladiolus in its periodicity. The bulbs will grow, bloom, mature their bulbs and foliage, die down, remain dormant and start to grow again two or three times a year under careful culture. This has its advantage in commercial cut flower practice. The other species are usually grown once a year, planting in the spring and digging the tubers in late fall or early winter.

As a result of its quick growing capacities, *Gloriosa* bulbs may be planted every week in greenhouse or Southern sub-tropical outdoor culture, and a continuous sequence of bloom obtained. A large, mature bulb, ripened and started to sprout will produce flowers in six to ten weeks, and will be ready to dig in two months, more or less, additional.

In Central Florida the bulbs seem to prefer sandy-loam soils on the acid side. They can be grown on heavy type soils, nearly pure muck, but there is danger of heavy loss of tubers from *Sclerotia* fungus attacks

where the drainage is not perfect. In the greenhouse the bulbs are sometimes grown in peat and sand with fertilizer added via soluble solution (Hy-Gro, etc.). They require little humus, no manure, and only a slight fertilization of the soil before planting with any good 5-7-5 mixture. Liquid fertilizer may be applied from time to time while the bulbs are growing and the watering should be generous, but not enough to cause "wet feet."

After the plants are a foot or two tall, they should be staked or tied to wires, or allowed to climb on some frame or brush. In nature they clamber through shrubbery to the sunlight. Bright sun induces more brilliant color of the flowers, stronger, stockier vines, but reduces stems and height of the plant. For cut flowers the vines may be trained on fence wire, and the flowers will be produced on wiry stems in the axils of the leaves as the plant grows taller.

Any good screened leaf mold type sandy loam, sterilized and well drained may be used to sow the seed. This should be in part shade, as of a lath house in the sub-tropics. The flowers and foliage have remarkable keeping qualities when cut, and stand shipping long distances, similar in this regard to the flowers of such old favorites as *Lilium rubrum*. The pollen may be removed before shipping. Special boxes are used with careful placement of the flowers inside.

Best results in planting *G. rothschildiana* are obtained by the amateur and professional grower who waits until the bulb is starting to sprout before planting. This is much like the recommendations for gladiolus. A thoroughly dormant *Gloriosa* bulb will grow in time, but may be several months showing itself above ground unless sprouted before planting.

The tubers have considerable vitality. Of half a dozen which the writer placed in an electric refrigerator food storage compartment in the winter of 1949-50 for six months, where they were subject to considerable desiccating influence and continuous temperatures of 40 to 55 degrees F., two survived with good vitality despite the thoroughly tropical nature of the plant. They produced large and vigorous vines and flowers. The other tubers were still sound when planted, but the bud eyes were dried beyond possibility of growth. Normally these tubers would have sprouted badly months earlier. The experiment showed the possibility of storage of *Gloriosa* tubers in a cool temperature with proper humidity, for the purpose of retarding growth over extended periods.

The *Gloriosa*, at least the species *G. rothschildiana*, is widely adapted to Northern gardens. During 1950, Mrs. William C. Bowers of Cooperstown, N. Y., who winters in Winter Park, Fla., purchased bulbs of *G. rothschildiana* from the writer in late spring and bloomed them at her summer home garden, Closet Hall, and exhibited them in July in the Cooperstown flower show, receiving the blue ribbon for the first showing of these flowers in that event's history. Another dirt gardener in Connecticut reported some years ago obtaining 20 blooms on a strong *Gloriosa rothschildiana* plant in the garden outdoors. Mrs. Bowers grew her *Gloriosa* partly in the ground in garden beds and partly in large pots placed outside after the bulbs had been started. She reported those

in the full sun in the open ground in a loamy soil made the strongest growth and the largest flowers.

Littonia, another South African plant novelty, has odd three-fingered tubers like those of *Gloriosa*, and produces a climbing stem with clasping tendrils of similar nature. The flowers are little orange-yellow bells and very charming. The culture is similar. *Sandersonia* also has orange colored bells.

The tubers of *G. rothschildiana* are not hardy in cold climates and will rot in the ground in cold wet weather. In Florida and other warm climate areas they will grow and increase from year to year in the garden or along the edge of shrubbery without attention.

Note: The chemical properties of *Gloriosa superba* have been studied and the tubers found to contain a poisonous alkaloid principle previously identified as superbin, which is now considered equivalent to colchicine, but this requires verification. We are indebted to Prof. W. M. Lauther of the University of Florida, College of Pharmacy, for the following:

"Your reference to C. J. H. Warden is interesting. He published three *Gloriosa superba* papers, Ind. Med Gazette, 1880, Vol. 15, p. 253; 1881, Vol. 16, p. 138 and Phar. Journal (British) Series III, Vol. XI, p. 496, 1880. He was professor of chemistry at Calcutta Med. College. According to him, 'superbine' is related to the bitter principle of squill. He found 10 mg. to be fatal to a cat.

"His work has been continued by the famous Wellcome Research Laboratories of London. I refer to the paper by Hubert W. B. Clewer, Stanley J. Green and Frank Tutin, in the Journal of the Chemical Society (British) Vol. 107, p. 835, 1915. These investigators say that Warden's toxic bitter principle is colchicine. They also isolated several other chemicals. We have now decided to follow their work, since we feel that *G. rothschildiana* and *superba* ought to be similar. The high ash content (2.8% for air dried sample) has us puzzled."

Dr. Lauther advises that the College of Pharmacy has assigned the project of analysis of *G. rothschildiana* to a graduate student. There is likelihood that colchicine and other alkaloids will be found.

This matter is presented in such detail as filling an important lacuna in the horticultural literature on the subject. None of the well known extended horticultural treatments of *Gloriosa* mention the poisonous properties of the tubers and plants. From Indian sources it has been learned that the tubers of *G. superba* are used by natives attempting suicide. In other words the warning may safely be issued to all gardeners and research workers using *Gloriosa* plants and tubers to beware of their poisonous character.

Just how poisonous the tubers and foliage will prove as grown in America will remain for future research workers to determine following the publication of such results as the investigations in Florida under Dr. Lauther's direction. The fact that the plants have been observed to have few insect or other pests is a strong supporter of the poison factor, something not uncommon in garden plants. Few insects have ever been

known to eat the foliage of *Gloriosa* plants, and little damage to the tubers from worms or insects has been found. Occasionally a worm hole can be found in a tuber, but never a live specimen thriving on the material.

Caution is therefore advised to keep the tubers and plant material out of the hands of young children who might put the same in their mouths. No cases of *Gloriosa* poisoning have been reported so far as known in America, but the possible presence of such deadly factors as colchicine indicates a strong need for precaution in this regard.

PLANT GROWING EXPERIENCES

WALTER ALLGEYER, *Michigan*

In the past 20 years I have grown a large variety of bulbs and plants, many of which are woods wildings. The woods near here are

Fig. 30. *Hosta plantaginea* Aschers.
Photo by Walter Allgeyer.

full of many varieties, and it is interesting to grow them in the home garden, especially if one has the large shade trees to help make them feel at home.

I have also grown 100 varieties of daffodils, jonquils, and the smaller species, all of which do very well here, and in tulips I have also grown both the hybrids, and many species.

Finding my soil rather heavy I spread sand between the rows, and later this was worked into soil. I found that this made a wonderful change in the soil. My bulbs grew to very large size, and had lovely large blooms. I use only bone meal as fertilizer, as these bulbs do not take barnyard manures very kindly.

For several years I have also grown Callas; they do well in the open soil, and should be kept moist during summer's growth. The Red Calla does very well, blooming freely, and forming nice clusters of bulbs. The care is about same as for other bulbs, only planting them out later, so late frosts will not harm them. In fall I take them up, and place them in flats, on some dry sand, and set them down in basement to rest. I cover the bulbs with some sand so that they do not dry out.

Hemerocallis, too, make lovely bloom in the garden, and now with the new colors, reds, wines, and purples, they just about fill the wants for bouquets. Grown easily in any soil, not bothered by any insects, they are a must for every garden. I have a large plant of Hyperion which this year produced many blossoms, and among them some with twelve petals, instead of the regular six. I tried pollinating these blooms, and one finally took, and I have four plants from the seeds. Perhaps one of the plants will turn out to be a twelve-petal flowering one; time will tell.

The illustration [Fig. 30] shows a clump of *Hosta plantaginea*. The many beautiful Hosta species deserve more attention than they are receiving at present.

Another very interesting plant is the woods wilding, Golden Seal, a medicinal plant. This does very nicely in the shade of my large oak trees, under the north side. I have a small bed of this plant, and find it very interesting to grow, it has large dark green leaves, and while the blossoms are small, and hardly noticeable, the later large red berries make up for small flowers. It is easily grown from fresh seeds. It can be taken up and divided most any time of the summer, and will never even wilt. In among these plants I have planted many other woods plants, such as *Trillium*, Blood-root, Wild-ginger, Wild Poppy, May-flower, *Hepatica*, and the Woods Lily, Turks Cap.

This bed makes a lovely showing all spring and summer and needs but little care. One thus has at least part of the woods near. As the large oaks take a lot of moisture in summer, I water the bed when necessary, to keep the plants fresh and growing.

I have many other plants, of which I may try to write at a later date.

PURE ARABINATES AS INGREDIENTS IN DIRECT STAIN-MOUNTANTS

HAMILTON P. TRAUB, *Principal Physiologist, Division of Fruit & Vegetable Crops and Diseases, Bureau of Plant Industry, Soils and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, Beltsville, Maryland.*

Permanent stain-mountants based on the principle of combining a suitable stain with water-soluble mounting media—(a) gelatine or pectin with sorbitol and acetic acid or (b) gum arabic with sorbitol and formic acid—were proposed in a stimulating article by Zirkle (1940), to whom we are all greatly indebted. These were proposed by Zirkle as starting points, and gelatine or pectin mountants are now commonly used. The optical properties of these are satisfactory for some purposes, but there is need, as suggested by Zirkle, for a mountant in this class with improved optical properties that shows the chromatin outline sharply.

It should be noted that the gum arabic of commerce consists of the salt of an organic acid, arabinic acid (Smith, 1939), with metals such as calcium, magnesium, and potassium (Neubauer, J. pr. chem. 1854, 62: 193.) together with some impurities. The preparation and use of the pure salts of arabinic acid have the advantage of eliminating any impurities that may be present in the commercial article and that might interfere with good optical properties when the salts are used as mountant ingredients. The various arabinic acid salts also impart distinctive values of their own. Accordingly, the writer recently explored the possibilities of using these compounds in cytological technic. He has found that the pure salts of arabinic acid, arabinates, [1 gm.], give direct stain-mountants with excellent optical properties when combined (a) with d-sorbitol c. p. [1 gm.] and [10 ml. of] the Pianese-Zirkle ferric-formo-carmine (Pianese, 1892, 1894; Zirkle, 1940); or (b) with d-sorbitol c. p. [1 gm.] and [10 ml. of] ferric-aceto-formo-carmine—various mixtures of ferric-formo-carmine and the Schneider-Belling ferric-aceto-carmine (Schneider, 1880; Belling, 1926); or (c) with d-sorbitol c. p. [1 gm.] and [10 ml. of] ferric-aceto-carmine with 2% glycerol by volume added. Preparations made with arabinate-sorbitol-ferric-aceto-carmine without the addition of ferric-formo-carmine or glycerol may sometimes become clouded when dried under certain conditions which makes them useless as permanent mounts in such cases.

Since the arabinates are subject to hydrolysis on heating in acid solution, the ferric-formo-carmine and ferric-aceto-carmine are prepared separately and the arabinate and d-sorbitol are added after the carmine solutions have cooled and have reached equilibruim under room conditions. The finely pulverized arabinate and d-sorbitol are added to the filtered ferric formo-, aceto-formo-, or aceto-carmine solution (which has cooled at least over night), and the mixture is stirred until the arabinate is dissolved. When the carmine solutions are prepared, it is best to use ferric nitrate as the source of iron at the rate of 0.05 gram per 100 ml.

volume of the carmine solution, and not 0.5 gram as indicated (probably a typographical error) by Zirkle (1940).

It was found desirable to heat the slide preparations for 20 seconds on a hot plate at a standard temperature as reported by Traub (1951b) in place of the inexact and messy flaming procedure.

These mountants are less viscous than when aceto-carmine is combined with gelatine or pectin. This makes it relatively easy, for instance, to prepare direct permanent root-tip squashes for the study of chromosome numbers in plants.

These studies with arabinate stain-mountants were begun six months ago and no attempt is made at this time to indicate any final conclusions. The present tentative conclusions are subject to revision if observation of the preparations over a longer period should so indicate. The reason for the present brief note is to give a background for the results recently reported with arabinate direct stain-mountants by Traub (1951a). The thorough exploration of the distinctive value of each of the arabinates in combination with cytological stains will take time, and more complete reports will be published elsewhere later—the first will appear in the near future (Traub, 1951c).

The various arabinates were prepared by interaction between arabinic acid (Smith, 1939) and various ethanol soluble metal or other salts in aqueous solution. In a few cases, it was necessary to carry out the interaction in 10% HCl or 4% HNO_3. When the interaction was completed, the time depending on the kind of salt, the arabinic acid salts formed were precipitated with three volumes of 95% ethanol and washed on a filter paper several times with 95% ethanol and absolute ethanol. They were again taken up in water, or dilute acid solution, and reprecipitated two or three times and were then dried to constant weight in a vacuum oven at 60° C.

Up to the present the following have been prepared: Aluminum-; ammonium-; barium-; beryllium-; bismuth ; calcium-; cerium-; cesium-; chromium-; cobaltous-; cupric-; ferric-; ferrous-; gold(auric)-; iridium-; lead-; lanthanum-; lithium-; magnesium-; manganese-; mercuric-; nickel-; palladium-; platinic-; potassium-; rhodium-; rubidium-; stannic-; stannous-; silver-; sodium-; strontium-; uranyl-; vanadly-; yttrium-; and zinc-arabinate.

Beryllium- and mercuric-arabinate are not recommended for use in mountants due to the toxic nature of the metal ions.

A more comprehensive presentation of these experiments will appear elsewhere.

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WESTERN TRIP—SPRING 1950

Mary G. Henry, *Pennsylvania*

My western trip this spring was extremely interesting. I must say it was a relief when the three lectures were over. Before leaving the State of Washington, Mr. Carl English, a correspondence friend of over fifteen years, and also Mr. J. R. Fletcher, Northwestern Regional Chairman of the American Rock Garden Society, took my daughter Josephine and me on a camping trip in the Cascade Mountains. I enjoyed this enormously. We slept high up in a rocky canyon. The temperature was below freezing and the stars were so brilliant they seemed to pierce the sky.

Lewisia rediviva was in full bloom on exposed hillsides, also a charming bright blue *Brodiaea* and an enchanting *Calochortus*. For the first time I saw *Paeonia Brownii* blooming in its own lair. As the season was somewhat late, I was able to gather some interesting seeds.

Ernest Perks brought my car to Seattle and Josephine and I motored south through Washington and Oregon to San Francisco. I went on a sort of *Camassia* "spree" and collected some in gorgeous shades of blue. Many were so dark, they verged on indigo. We found some creamy white ones and also some whites that were shaded with pale blue. These beautiful hardy bulbous plants should be in every garden for they are long lived, as hardy as rocks, and especially valuable as good blue flowers are all too rare. Being an ardent conservationist, I only felt able to take a few specimens from each group.

The Brodiaeas, too, delighted me beyond words. For years I have seen their pictures in the Carl Purdy catalogue, but I never realized their full beauty until I saw them "in the flesh." There were several species of blue *Brodiaea*. *Brodiaea* laxa (I think) fairly competed with the Camassias in their wonderfully rich deep blues. There was a species that had white flowers and each segment had a navy blue stripe down the center. It was one of the loveliest flowers I ever saw. Some of the species had large heads of purest golden yellow and some had yellow flowers streaked with garnet brown. These beautiful and showy flowers, which reminded me of tiny *Agapanthus*, must be seen to be appreciated.

They should be grown in eastern gardens more frequently and where the climate is severe, they are well worthy of being grown in pots. The flowers are very long lasting.

Among Alliums, *A. falcifolium* was outstanding, but there were other pretty ones, too.

Coming down into California, we drove through the Redwood forests. Our first view of the Redwoods, *Sequoia sempervirens*, was in late afternoon. The rain had just stopped. The slanting rays of the sun shone through the mist until they touched the forest floor, where

Fig. 31. Mary G. Henry passing through the famous Wawona Tunnel Tree (*Sequoia gigantea*). Her car, equipped for field work, has an "attic" in which are carried spare tires, plant presses, rope, etc. The rear compartment is insulated and ventilated for plants. Inside the car is a bookcase, a desk with reading light, a picnic basket, camera, field glasses, axe, picks, spades, labels, and also numerous geological and topographical maps.

Rhododendron californicum bloomed in all its glory. It was indeed a never-to-be-forgotten sight. We were fortunate that the beautiful California *Azalea* was in full bloom too—very lovely and deliciously fragrant.

There seemed to be Brodiaeas at almost every turn, and I saw a few of the enchanting red one, *B. ida-maia*. There were a number of others too and all were beautiful.

The coast line of northern California is a rough and jagged one and the turf on the rocks jutting out into the sea forms a carpet that is colorful and beautiful beyond words. This is composed of Scarlet Paint

Blush, Lupines in pink and white, blue and white and plum and white, a prostrate *Eryngium* of stylish design. *Brodiaea coronaria macropoda* are completely adorable tiny things, blue with white centers, only 1 to 3 inches high, and stunning silvery sedums.

After a few days in San Francisco, Josephine took the train home and I continued my way in the car with Ernest to the Yosemite. Its beauty is not in the least exaggerated, and the stern and simple beauty of El Capitan is very inspiring, but I must say the hordes of tourists did irk me and I could not enjoy the scenery except when I got off by myself in the mountains. After all, I love the trees and flowers and always find them ample and sufficient company.

After that I visited Kings Canyon. I was thrilled beyong words to find *Yucca whipplei* in full bloom on steep canyon walls and even on the summits of the mountains. It was most spectacular and it was a sight I had dreamed of seeing some day. This was the "some day" and I was not disappointed.

I had quite an exciting time with a big 5 ft. rattlesnake. Some Brodiaeas were ahead and I stepped within about 18 inches of him. With my bare legs I would have been an easy mark, but it was kind enough to rattle. I think he could have struck me if he had not been in tall wiry grass. He was a handsome creature and gave me a real thrill.

After that I went to the Sequoia National Park and saw hundreds of big trees, *Sequoia gigantea*. They were so grand and each one I saw seemed more wonderful than the one before. This was my first visit to California. I had been to every other state in the United States. Somehow I postponed California because everybody else seemed to go there, but I really wanted to see the big trees and now I want to return some day and see them again.

Fremontia californica was in its fullest golden bloom on a mountainside, where illuminated by the setting sun, it made a breathtaking sight. Their enormous yellow flowers, as big as dogwood blossoms, covered the 5 to 10 ft. bushes solidly to the ground.

Going south I came to the Mojave Desert, which at this time was rather a depressing sight, except for one mass of utterly delightful golden yellow Brodiaeas, which waved in the breeze. Every other bit of foliage was browned and dry.

Then I saw the man-made Lake Mead and Boulder Dam, which, as it destroyed much natural beauty, did not interest me at all. The nearby city of Las Vegas is a fairylike city of marvelous modern architecture.

From there I went to Utah, where I motored through Zion Canyon and Bryce Canyon, the latter of such beauty and remarkable form and coloring, it looks as though it belonged to a different world than ours.

The Grand Canyon, Arizona, came next. I had been there over 40 years ago. In those days one could enjoy the grandeur without the present day commercialism. It was simpler then. We were content to enjoy the natural beauty of this sublime spot and we spent most of our time on horseback. Now there is a large hotel and there are walls,

parapets and paved roads. Huge horn-blowing busses are running in and out all day long. Also, the tranquillity of the atmosphere has vanished.

In various places I found handsome Agaves in bloom, one had lovely creamy white flowers and another had blooms of golden yellow.

One of the biggest thrills of my life came one day when we got lost in the mountains in Arizona. Mrs. Rose Collom was with me at the time. We were on a little narrow rocky road, only wide enough for one car. When we came near the top of a mountain, *Agave parryi* appeared on every side [Plate 20]. They provided a spectacle of magnificence that I can never forget. The buds and large unexpanded flowers were glossy blood-red. Therefore, some of the spikes were all red, some were entirely yellow and some combined the two colors of the buds and open flowers. I could hardly believe my eyes when I measured one beside the road and it was 21 ft. 3 inches tall. It was more like a tree than a spike of flowers!

In Texas I found my largest and most splendid species of *Hymenocallis*.

Although I have Yuccas from about thirty localities planted in and around my rock garden, I just could not resist collecting a few more.

I must not forget the Cactus. I fell in love with their large fragile looking flowers in etherial pale shades of pinks, sea greens and creamy whites, and acquired eight species. Of course my hands also acquired many thorns.

Soon I found myself in the Oklahoma mountains. This, my third visit to the Ozarks, was interesting as always and I had quite a little adventure on top of one of the mountains there. I spied what to me was a new variety of the pretty purple *Liatris squarrosa* which grew about 6 to 8 inches high and bore flowers singly. The little plants grew along the edge of a perpendicular cliff about 50 or 60 ft. high. I remarked to Ernest there were so many here I should be able to find an albino and it would be just my luck that it was part way down the cliff. I looked over the edge and sure enough there in a little crack away below the top, a stunning little white Liatris looked up at me! Ernest tied the tow rope around me and lowered me over the cliff, so I could pry the little Liatris out of the crack. It was a lot of fun and one of the high spots of the trip.

From there my way led me into Arkansas, Louisiana, Mississippi and then up through Kentucky and Tennessee to Indiana, where, with someone's help, I was able to find my most northerly station for *Hymenocallis*.

The eight weeks passed far too quickly. During this period I covered, all too rapidly, over 12,000 miles. The car by this time was pretty chock-full of plants. As I always like to get home before the car, to open my mail, I took the train home from Louisville, and arrived at Gladwyne July 15th.

Agave parryi of Arizona—blood-red buds open to golden yellow flowers. Mrs. Mary G. Henry is standing at the base of the plant. Photo by Mrs. Rose Collom.

Plate 20

PLANT LIFE LIBRARY

PLANT VIRUSES, by Kenneth M. Smith. Methuen & Co. (London) and John Wiley & Sons, 440—4th Av. New York 16. 2nd ed. 1948. pp. 78. illus. $1.50.

This second edition of this concise illustrated text was made necessary to keep pace with the rapid progress in this field. Besides the historical chapter, there are chapters on virus diseases, modes of virus transmission, the viruses in the insect vectors, the viruses themselves, serology of plant viruses, control of plant viruses and the nature of viruses. All of those concerned with plants will want to own this concise text.

MENDELISM AND EVOLUTION, by E. B. Ford. Methuen & Co. (London), and John Wiley & Sons, 440—4th Ave., New York 16. 5th ed. 1949. pp. 122. $1.25.

This the 5th edition of this well known text, giving "a short survey of the evolutionary aspect of modern genetics," is an important contribution to the subject. It includes a brief preliminary section on the principles of particulate inheritance to bring the subject of the book within the reach of all who are interested in evolution, whether they have had previous acquaintance with genetics or not. The longer section is devoted to mendelism and evolution.

PROBLEMS OF MORPHOGENESIS IN CILIATES, by André Lwofi. 1950. John Wiley & Sons, New York 16. pp. 103. illus. $2.50.

This is another in the excellent Biological Research Series published by John Wiley and Sons. It is a concise volume devoted to the morphology and biology of the ciliates. The author "considers the behavior of the kinetosomes and analyzes the various aspects of their movements and activities in development, division and evolution." The book includes 32 illustrations and a bibliography.

BOTANY: AN INTRODUCTION TO PLANT SCIENCE, by W. W. Robbins and T. E. Weier. 1950. John Wiley & Sons, New York 16. 11. 480. illus. $5.00.

This copiously illustrated text, written primarily for beginning students, cannot be too highly recommended. The authors emphasize the recent discoveries in the field, and they have endeavored to give the student "an understanding of the scope of botany and its relation to agriculture, forestry, and medicine and to the other physical sciences.

CONSERVATION OF NATURAL RESOURCES. Edited by Guy-Harold Smith. 1950. John Wiley & Sons, New York 16. pp. 552. Illus. $6.00.

This very timely book, which is the composite work of various authors, reviews the history of conservation in the United States, and the disposal of the public domain, and then each resource in turn is considered in detail—forest, water supply, mineral kingdom, wildlife, rec-

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PLANT LIFE

Volume 7

[Number 3, July]

1951

THE AMERICAN PLANT LIFE SOCIETY

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Box 2398, Stanford, California

THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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Note: Introducers of new daylily clones should send plants directly to the Trial Gardens for testing. As soon as practical each trial garden will publish, in HERBERTIA, lists of the 10, 25, 50 and 100 best daylilies, on the basis of the clones tested, for the climatic region in which it is located.

DATA CARD FOR HEMEROCALLIS

When describing daylily clones, all breeders and growers are requested to use the Official Data Card for Hemerocallis, devised by the eminent artist and horticulturist, J. Marion Shull, and full described in HERBERTIA, Vol. 7, 1940, and Vol. 14, 1947. These cards should not only be used in describing new clones but also for the description of all older clones grown in the various climatic regions.

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For the official score card for Hemerocallis see HERBERTIA, Volume 7, page 126, 1940. Reprinted in Vol. 14 (1947), page 37.

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For classification of flower types and score card for Hybrid Amaryllis see PLANT LIFE *6*: 43-46. 1950.

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This is required reading for every amaryllid enthusiast.

2. DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948, by Norton, Stuntz, and Ballard. A total of 2695 *Hemerocallis* clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (I—X; 1—90), including a portrait of George Yeld. $1.50 postpaid.

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Vol. 1 (1945), *Narcissus* symposium and *Bromeliaceae* edition, 104 pages, incl. 25 illustrations, $2.50.
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Vol. 3 (1947), Winter and Spring *Gladiolus*, and the History of the Dutch Bulb Industry, 1940—1945; 42 pages, incl. 10 illustrations, $1.50.
Vol. 4 (1948), Aroid Lily (Calla) edition, 48 pages, incl. 11 illustrations, $1.50.
Vol. 5 (1949), *Gesneriaceae* edition, and 1949 HERBERTIA (Australian edition), 134 pages incl. 34 illustrations, $5.00.
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Vol. 7 (1951), 1951 HERBERTIA, and GENERAL PLANT LIFE edition (In preparation, 1950, and scheduled for publication early in 1951.), $5.00.

Vols. 1—5 (1945—1949), $13.00.
Single volumes, 1—7, when available, at the prices quoted above.

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reational resources, and the conservation of resources from the standpoint of local, state and national planning. It is a book that fills a definite need and is highly recommended.

THE WORLD OF PLANT LIFE: A GENERAL BIOLOGY, by W. F. Pauli. 1950. Houghton Mifflin Company, Boston 7, Mass. pp. 653. Illus. $5.00.

This excellent and adequately illustrated text for the college student is intended as "an introduction to the entire wide field of general biology." In his presentation, the author has endeavored to stress the scientific method, to attract and stimulate the student, and to present a unified outlook on general biology on the basis of organic evolution. It is a text that should have immediate appeal, not only to college students, but also to students of biology generally, and should go through many editions.

THE PRINCIPLES OF NURSERY MANAGEMENT, by W. P. Duruz. 1950. A. T. de la Mare Co., 448 W. 37th St., New York 18. pp. 125. $3.50.

This concise illustrated text is devoted to the many phases of the nursery business and was "written to fill the need for a guide to the practice and study of nursery management." It is a book that all who are interested in the subject will want to own for constant reference.

GRAY'S MANUAL OF BOTANY, by Merritt Lyndon Fernald. 8th ed. Illus. 1950. pp. 1632. American Book Company, 88 Lexington Ave., New York, 16. $9.50.

This monumental 8th edition of the standard text on the flora of the Southeastern United states and adjacent Canada, has been largely rewritten and expanded by the late Dr. Fernald. The detailed descriptions of the taxonomic groups is preceded by a synopsis of the orders and families, an artificial analytical key to the families. The text is copiously illustrated, and adequate keys to the species are provided under each of the genera. There is a glossary of terms, and an index to names of

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PLANT LIFE

Volume 7

[Number 4, October]

1951

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families, genera and species. Like its predecessors, it is a text that all students of the field covered must have near at hand at all times for convenient reference.

A HISTORY OF HORTICULTURE IN AMERICA TO 1860, by U. P. Hedrick. 1950. Oxford Univ. Press, 114-5 5th Ave., New York 11. pp. 551 Illus. $7.50.

Although shorter treatises have previously appeared on this subject, this is the first comprehensive book on the history of American horticulture up to 1860. Part I is devoted to Indian gardens and the colonial period; Part II covers the post-Revolutionary period up to 1860; and Part III is devoted to the topics, botanical explorers and botanic gardens, the dawn of plant breeding, horticultural literature, and horticultural societies. The book is illustrated, and will be an important addition to the gardener's library.

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See page 170, for other plant group committees.

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EDITED BY

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CORRIGENDA

PLANT LIFE, VOL. 7, 1951

Page 3, II. SPECIOLOGY section, after last line, insert "Amaryllid Genera and Species, by Harold N. Moldenke ..... 78."
Page 17, 4th paragraph, 4th line, for "door-yeard" read "door-yard".
Page 38, line 19 from top, between "is" and "fine" insert "a".
Pages 68—71, wherever "*Amaryllis advena* Ker-Gawl." appears change to "*Amaryllis bifida* Herb."
Page 76, under "Hybrid Amaryllis Clone", 3rd line, for "coloe" read "color".
Page 156, 6th paragraph, 6th line, for "vanadly" read "vanadyl".

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PLANT LIFE, VOL. 8, NO. 1, JANUARY, 1952

HERBERTIA

1952

SECOND ALSTROEMERIA EDITION

EDITED BY

HAMILTON P. TRAUB

HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY

Box 2398, Stanford, California

[HERBERT MEDAL CITATION, continued from page 8.]

By ignoring the unmistakable facts in SPECIES PLANTARUM, ed. 1. 1753; by disregarding the prior 1783-work of the great French scientist, Lamarck; and by acting directly contrary to the later adopted retroactive INTERNATIONAL RULES, a few workers had attempted, fortunately without success, to switch names. It was Dr. Uphof who, reinforced by the 1929 contribution of the late KEW authority, Dr. Stapf [Bot. Mag. Lond. 153: sub pl. 9152, footnote page 3. 1929], and the 1943 HERBERTIA contribution [HERBERTIA 9(1942): 101—102,146. 1943] of Mr. Hannibal, presented facts that showed the untenable nature of any such attempts.

It will not be necessary to go into the minute details here since these are now generally known. These facts have recently been fully reviewed by Traub & Moldenke [AMARYLLIDACEAE: TRIBE AMARYLLEAE. 1949]. In accordance with the INTERNATIONAL RULES OF BOTANICAL NOMENCLATURE, the facts, in brief, are: (1) Linnaeus unmistakably omitted the CAPE BELLADONNA form SPECIES PLANTARUM, ed. 1. 1753, and it was not mentioned in this work even incidentally. This in itself should have been sufficient to stop any attempted misapplication of names. (2) The name, *Amaryllis beladonna* L., was given by Linnaeus in SPECIES PLANTARUM ed. 1. 1753 to the AMERICAN BELADONNA as indicated by no less than 15 direct and indirect literature references, *including three unmistakable illustrations*, and a direct statement by the eminent Dutch scientist, Hermann, in 1698, that it was a plant *with a hollow peduncle*. (3) The great French scientist, Lamarck, noted the omission of the CAPE BELLADONNA [a plant known to have *a solid peduncle*], and gave to it the first name under the INTERNATIONAL RULES, *Amaryllis rosea* Lamarck (1783). (4) William Herbert in 1819 made the AMERICAN BELLADONNA the type of the generic name, *Amaryllis* L.; and (5) in the same year, 1819, Herbert also proposed the valid generic name, *Coburgia Herb.*, with the CAPE BELLADONNA as the type. (6) The actions under (4) and (5) above are *irreversible* under the INTERNATIONAL RULES OF THE BOTANICAL NOMENCLATURE. (7) The attempt of Herbert, in 1821, *to reverse himself for sentimental reasons*, and the later attempts of a few to bring in immaterial *ex post facto* happenings, and to try to use immaterial alleged circumstantial evidence in botanical science, all have no effect under the INTERNATIONAL RULES which are set up to settle cases according to facts. (8) For the CAPE BELLADONNA, the valid name is *Coburgia rosea* (Lamarck) Gouws [PLANT LIFE 5: 64. 1949], if it is to be maintained as the type of a nomenclatural genus. However, it produces fertile hybrids with *Brunsvigia* species, and the morphological differences between the two genera are only of specific importance, and thus the CAPE BELLADONNA has been transferred to the latter, and it becomes *Brunsvigia rosea* (Lamarck) Hannibal, if the viewpoint is accepted that there must be a *distinct gap* for generic distinctions.

[HERBERT MEDAL CITATION, continued on page 35.]

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PREFACE

This is the 19th consecutive volume of HERBERTIA, the publication devoted exclusively to the amaryllids and the workers concerned with their advancement. As the present members know, the articles are written *by the members* of the AMERICAN AMARYLLIS SOCIETY which is an integral part of the AMERICAN PLANT LIFE SOCIETY, and functions as a comprehensive committee for the advancement of the amaryllids. *For the information of new members*, it should be indicated that it is the objective to include as many suitable amaryllid articles of a *popular nature as can be obtained* and accommodated, and also articles on fundamental amaryllid research. The members of course realize that without new discoveries, the spring of amaryllid knowledge would soon dry up, and we would soon be marking time—repeating ideas already known, and thus progress would come to a stop. This was actually the case for about fifty years before the present Society was organized in 1933. The volumes of HERBERTIA are thus a mine of amaryllid knowledge, including descriptions of new species and cultivated varieties, breeding methods, propagation procedures and amaryllid culture. In addition to HERBERTIA, the Society also published occasional numbers on other plant subjects of interest to the members so as to maintain *a well rounded gardening viewpoint*. Due to the post war inflated prices, the various numbers are bound in one book as a temporary economy measure so as to delay any increase in dues as long as possible.

The 1952 WILLIAM HERBERT MEDAL has been awarded to Dr. J. C. Th. Uphof, the eminent Dutch-American plant scientist, to whom we all owe a debt of gratitude. His *research* articles in 1938 and 1940 HERBERTIA on the name *Amaryllis* L., have made it possible for all of us to use this name correctly. No longer need we use *Amaryllis* in popular, and an inelegant invalid name in scientific usage. The right name has been stabilized for all time.

This edition is dedicated to Dr. Uphof, and in accordance with tradition, he contributes an interesting autobiography to it, detailing his activities in Europe and America.

The 1ST ALSTROEMERIA EDITION appeared a decade ago, in 1942, and it is fitting that the progress in *Alstroemeria* breeding and culture since that date is now summarized in the present 19th consecutive issue of HERBERTIA, devoted exclusively to the amaryllids, which thus becomes the 2ND ALSTROEMERIA EDITION.

The beautiful cover design by Mr. Mulford B. Foster is based on *xAlstroemeria racinae*, a fragrant hybrid originated by the artist.

Dr. Uphof contributes a review of the genus *Alstroemeria*, long overdue, for which the members will surely be very grateful. It is hoped that Dr. Killip of the U. S. NATIONAL HERBARIUM, the only world authority on the genus *Bomarea*, will contribute a much needed monograph on that genus in the columns of the CONTRIBUTIONS OF THE U. S. NATIONAL HERBARIUM.

Other contributions on *Alstroemeria* in the present issue include an article on fragrant *Alstroemeria* hybrids by Mr. Foster, an article on

advances in *Alstroemeria* culture by Mr. Harry L. Stinson, and other interesting *Alstroemeria* articles by Prof. Bullock, Prof. Ballard, Mr. Ruckman and Mr. Orpet.

However, the other amaryllids are not neglected in the present issue. Mr. Manley contributes a report on the 1951 *Amaryllis* display at Cleveland, and a summary of the 1951 Valleevue *Amaryllis* trials; Mrs. Morton reports on the 1951 New Orleans Amaryllis Show. Interesting *Amaryllis* articles are also contributed by E. Dourlas, Hermon Brown, Dr. Thornburgh, and Dr. Buck.

Wyndham Hayward reports on the 1951 Orlando-Winter Park *Hemerocallis* Show, and Dr. Corliss shares with us his 1951 visits to *Hemerocallis* gardens. Mrs. Henry presents further details on an *Hemerocallis* chimera, Prof. Ballard writes on progress in *Hemerocallis* breeding, and Mr. Gilmer reports on the selection of *Hemerocallis* clones for garden value.

There is also a wealth of other amaryllid articles in the present issue, including, among others, contributions on the 1951 Daffodil Season by Mr. Mitch, Australian amaryllids by Prof. Eardley, *Lapiedra martinezii* by Dr. A. Fernandes, Alliums by Bernard Harkness and Dr. Uphof, *Zephyranthes* by Mrs. Clint, *xCrinodonna* by Mr. Hannibal, garden value of amaryllids by Mr. Hunt, Texas amaryllids by Thad Howard, *Crinums* by Mr. Hayward, *Hymenocallis* by Mr. Woelfle and Mr. Hayward, and winter-forced amaryllids by Mrs. Henry.

The 1953 HERBERTIA will be the 2ND NARCISSUS EDITION. However, the other amaryllids as usual, will not be neglected in this issue. The members are urged to send in articles for this issue as soon as convenient, before July 1, 1952, if at all possible.

Your senior editor has reached retirement age, and by the end of the present year, he will make his home at 1531 Rodeo Road, Arcadia, California. Members journeying in the neighborhood are invited to stop in to visit. He will have additional leisure time to devote to his editorial duties. One of the first projects to be undertaken is the writing of a *popular* HANDBOOK OF AMARYLLIS which is most urgently needed.

—*Hamilton P. Traub*
Harold N. Moldenke

December 17, 1951.

1952 HERBERT MEDAL AWARD CITATION

The following citation for the 1952 WILLIAM HERBERT MEDAL award is reproduced for the information of the members.

"The scientific world owes the eminent Dutch-American botanist, Dr. Uphof, a debt of gratitude. It was he who published his stimulating HERBERTIA articles in 1938 and 1940 on the correct application of the names, *Amaryllis* L. (genus), and *Amaryllis belladonna* L. (species).

[HERBERT MEDAL CITATION, continued on page 6.]

Dedicated to
J. C. Th. Uphof

Herbert Medalist—Dr. J. C. Th. Uphof

Plate 1

JOHANNES CORNELIS THEODORUS UPHOF

An autobiography

It is a great honor to receive the HERBERT MEDAL award for having added some light on the nomenclature of *Amaryllis* L., the type genus of the *Amaryllidaceae*. My article was written on invitation some years ago of Dr. Hamilton P. Traub, and Mr. Wyndham Hayward, asking me to contribute something for the Yearbook HERBERTIA. I chose to conduct a research into the history of the names *Amaryllis* and *Hippeastrum*. As a result of all of this, I have now to appear in this issue of HERBERTIA with an autobiography. *Jacta alea est.*

My relations to the plant sciences have always been varied and extensive. There is no doubt that this was due to the stimulus I received at an early age.

CHILDHOOD AND YOUTH

I was born on June 11, 1886 in Ouder Amstel near Amsterdam, Netherlands. [Fig. 1] I was an only child. [Figs. 2 and 3] My father Th. J. Uphof and my grandfather J. G. Uphof were both well known lumber merchants. They obtained their lumber from abroad, especially by ocean steamer from Sundsvall in Sweden, Archangel in Russia and by rafts via the Rhine from the Schwarzwald or Black Forests in Germany, since Holland can not be considered a lumber producing country. The grandfather on my mother's side, J. H. Vermolen was an engineer, having charge of the repairs of the big ocean steamers sailing between Amsterdam and Java.

There are many happenings in my early life, before I was four years old, that I can vividly remember. The hobby of my father was always the study of English and French literature. My mother and my grandparents influenced me in the direction of nature study, especially plants. Also the environment of our lovely country home along the river De Amstel [Fig. 1] in which I was born and reared, and which was one of the wedding gifts of my mother's parents, added to my opportunity for nature study. With my father or when alone, I went on trips, collecting native plants and I soon started an herbarium. At an early age I tried to learn the scientific names, because it was always impressed upon me that common names were of little or no use and caused confusion. I also went with my father on walks to different parts of the port of Amsterdam, where I could see the big ocean steamers from far off countries. I wondered at that time whether I would ever have a chance to visit these countries when I became older.

Who could fathom my delight when I got in 1897, as a present during St. Nicholaas (December 6) from my grandmother Uphof, my first book on nature study. It was entitled "Door het Rietland" (Through

the Reedland) by E. Heimans and Jac. P. Thijsse, which was followed later during other St. Nicholaas Feasts and birthdays by additional volumes of this series, so popular in the Netherlands. At an early age my parents gave me a Dutch translation of Kerner von Marilaun's "Pflanzenleben" and Brehm's "Tierleben." These extensive and well known works stimulated my love for nature tremendously.

A the proper ages I attended the Elementary School and the High School. It must be said that the studies in Holland, like in most countries of Europe, are very difficult indeed. Besides the complicated grammar of the Dutch language, it was a "must" and nothing else, to study "de drie vreemde talen" (the three foreign languages), under which are understood English, French and German. I had to start in my time with French when I was nine years old, and at the age of eleven, we children were obliged to speak French in school during most of the courses and also during play time. For each Dutch word that we spoke, we were fined one cent. Also at home I often had to speak French with my father. To this foreign language were later gradually added German and finally English, of which I had only three years. With these came ordinary courses, like history, mathematics, geography, sciences and other regular subjects. I regret very much that we never learned public speaking. Even at the present time it is not greatly emphasized. This is very essential for those coming to the United States.

Vacation time, which lasted from 4 to 6 weeks, was always welcome. This time was usually passed with my parents and grandparents in the vicinity of Arnhem (eastern Holland) or near Haarlem; also along the river De Vecht with its beautiful castles and pretty estates, surrounded by grand parks and gardens. We visited the rich collections in the hot houses filled with exotic orchids and other tropical plants. The experienced "tuinbaas" (estate gardener) told us many interesting things about all these unusual plants. Needless to say, we also visited the bulb fields during "de bollentijd" (the bulb time), roaming over the nurseries of van Waveren and van der Schoot that were covered with masses of flowering hyacinths and tulips. We saw the beautiful flowering Amaryllis hybrids in the greenhouses of Ludwig. I often entered the grounds of "De Hartecamp" where once Carolus Linnaeus worked under the wealthy George Clifford. Some of the big greenhouses, so-called "orangeries" were still there. No doubt the great Swedish botanist must have worked in these houses. When in Arnhem, we regularly visited some parts of western Germany.

When I finished my Secondary School education, I decided to specialize first in horticulture and later in botany. I was advised to work first for a year in a nursery before entering college. Therefore, I became a student helper in the nursery of Mr. van der Hoeve, Rustenburger Straat in Amsterdam which was a very large establishment, having many greenhouses where very much was to be learned. It was here that I saw for the first time a group of *Brunsvigia rosea* (Lamarck) Hannibal (syn.—*Amaryllis belladonna* Herb., non Linn.). The next year I was

admitted to the well known College of Horticulture at Frederiksoord, a foremost institution where many pleasant years were spent. The collection of plants in the many greenhouses, arboretum, rockeries, orchards and those in the division for annuals and perennials were tip-top and could favorably be compared with similar institutions I visited later in Germany, France, Belgium and England. At the present time this institution has expanded still more.

Fig. 1. The Uphof Home on the de Amstel River, Ouder Amstel, near Amsterdam, where Dr. Uphof was born and reared.

After graduation, I took up post graduate studies at the University of Amsterdam where I attended a number of courses in botany under the world famous botanist Prof. Hugo de Vries, the founder of experimental evolution and one of the rediscoverers of the Laws of Mendel. Besides this, he was also an outstanding plant physiologist. I need hardly mention how much influence this association had on my life. My work in the Botanical Garden and Botanical Institution was unusually happy and I took advantage of everything relating to botany. I frequently helped De Vries in his experimental work. Later I kept up correspondence with him until shortly before his death in 1935. I regularly visited him upon my return to Holland. I also got acquainted with

Mr. A. J. van Laren, the Hortulanus (Curator) of the Botanical Garden or Hortus Botanicus. He is well known for a book he wrote on cacti, containing many colored illustrations and which has been translated into English.

In the meantime I became member of de Nederlandsch Natuurhistorische Vereeniging (The Netherlands Society for Natural History), division Amsterdam. This society had many members among the students, teachers and cultured laymen. Lectures and demonstrations were given in one of the halls of Natura Artis Magistra, the Amsterdam Zoo. There were also enjoyable excursions with the members to different parts of the country where the flora and fauna of the Netherlands were studied under an expert guide. Occasionally I had something to demonstrate during the meetings and became better acquainted with the chairman, Dr. H. Heukels, instructor of botany and zoology of one of the high schools in Amsterdam, who was author of the three volumes of "De Flora van Nederland." He had great influence on my biological career. He was also editor-in-chief of "Woordenboek voor Nederlandsche Plantennamen" (Dictionary of Dutch Plant Names) of which I was collaborator, collecting vernacular plant names for the most part from the province of Drente.

Occasionally, I also attended the meetings of the Nederlandsche Maatschappij voor Tuinbouw en Plantkunde (the Netherlands Society for Horticulture and Botany). I attended the lectures of Dr. J. Ritzema Bos, Professor of Plant Pathology, also well known in this country. I might add that I was lucky to receive a silver medal for a number of herbarium plants that were exhibited in an horticultural fair in the city of Sneek (Friesland).

I was therefore brought up in an entirely Dutch atmosphere and culture with every possible advantage offered by my parents and grandparents. I was no less stubborn than any other Hollander, a character of which many are proud. It is found in the entire Nation. It could not be conquered by the Germans under Hitler; by the French under Napoleon, or by the Spaniards under Charles V and Phillip II, who were no more successful during the Eighty Years War. Who else could? Independence comes foremost.

EUROPEAN TRAVELS

The time arrived when I wished to continue my studies and experiences in foreign countries, against which my parents had no objection. In fact it is a part of the life of an educated Hollander to go abroad for some years. Otherwise it was said that he might become narrow-minded. Therefore studies and work abroad are much encouraged. The first year I went to Germany and settled in Quedlinburg am Harz, one of the oldest towns in the country. Here were large seed nurseries where there was much opportunity to learn practical plant breeding and seed growing in the large establishments of Friedrich Roemer, Heinrich Mette and Gebruder Dippe. There was much opportunity to study the wild

flora in different parts of the Harz Mountains that were nearby. Afterward a few months were spent at the beautiful and modern Botanical Garden and Institution of the University of Berlin at Berlin-Dahlem, working in the herbarium, museum, and the extensive garden. In the plant geographical section practically the entire temperate zone was represented, and it is still unique. The numerous greenhouses offered much material in tropical and subtropical plants, among which the economic plants were very extensive. It was an honor to become acquainted with some of the outstanding German botanists, among whom were Adolf Engler, Ludwig Diels, H. Harms, R. Pilger and other eminent members of the staff. Upon my return to Quedlinburg, I visited the interesting potash mines in Stassfurt not far from Magdeburg. In the autumn I had to return to Holland. Most of the trip was on bicycle.

Fig. 2. Dr. Uphof at the age of 6 months.

I went through the Harz Mountains and then through a number of cities among which were Kassel, Mainz, Frankfurt am Main and Wiesbaden, finally along the Rhine to Bonn and Cologne, visiting along the way the lovely Frankfurter Palmengarten and some of the orchid nurseries. In Wiesbaden the parks and some of the large estates were visited. I was just in time to find the meadows of the Taunus Mountains covered with numerous wild flowering *Colchicum autumnale*. Every part of the College of Horticulture and Viticulture at Geisenheim am Rhein had to be inspected. It was very modern and attractive, as were also the numerous vineyards along the mountains. How beautiful were the large collections of Bromeliads in the Botanical Garden of the University of Bonn. Three greenhouses were filled with hundreds of species and hybrids. At present it is still among the larger Bromeliad collections in the world. My time was well spent in Germany and the Germans were always most helpful to foreigners to show everything of interest in their

country. At last I arrived in Maastricht, a city in the southern part of Holland; from there I took the train back to Amsterdam.

During the winter months in Amsterdam I attended some more lectures under de Vries and also had to learn Swedish from the Consul of Sweden, as it was my intention to go the following year to the Scandinavian Countries.

In February 1919 the S.S. Sunpulp, a Norwegian steamer brought me from Amsterdam to Gotenburg, Sweden. It was very cold at that time and the roads were difficult to pass on account of the snow and ice. Soon I found a convenient home in the small town of Moelndal, hoping that nobody would speak French, German or English in order to force myself to speak Swedish. From here I could make many trips to Gotenburg and other places of interest. Here was much to be learned. There was in the city the beautiful and extensive Traedgardfoereningen (Horticultural Society) with its large collections of plants, especially those displayed in the hothouses. The most outstanding at that time were the Orchids, Aroids and Palms. There was one large and high greenhouse filled with several varieties of *Camellia japonica*. I have never seen taller specimens, even in Florida. There was the interesting flora of Sweden along the rivers, including the Gota Elf, and the many lakes and the forests back in the country. The Swedish people were everywhere kind and hospitable. Everything typically Swedish had to be shown. Several hours by train in the southern direction of Gotenburg is Malmoe, and not far from this city is the small town of Svaloef with its world famous institution for plant breeding, called Sveriges Uetsaedesfoereningen where I had the privilege to stay quite a while. Everything was demonstrated to me regarding the scientific improvement of wheat, oats, barley, potatoes, beets and many other agricultural crops. They increased the harvest in Sweden considerably. The Svaloef varieties have also been introduced into many other countries. I had the pleasure of becoming acquainted with Dr. Hjalmar Nelson the director, with Dr. N. H. Nilson Ehle and many others of the staff.

Malmoe is not far from Copenhagen, Denmark. The narrow sound is soon crossed by boat. I visited in that country the Botanisk Have (Botanical Garden) and a number of nurseries and estates. Without exception they were well kept. The Danish know how to grow their plants.

After some time I returned to Sweden. On a Sunday when I bicycled to Saroe not far from the coast, where I planned to visit a number of estates, I had the privilege of watching the esteemed King Gustav V playing his beloved sport, namely lawn-tennis with one of the princesses. I have never seen a man playing so enthusiastically and with such attention as this ruler. Finally he left, crossed the road and went to his summer residence.

I returned to Holland in November. Upon my return I was able to spend some time in Norway, particularly Oslo, Drammen and Skien.

Upon my return to Holland I met Hugo de Vries who was delighted to hear that I had been in Svaloef for some time and was anxious to

hear about its new undertakings. De Vries visited this institution some years previously and had written much about it in different publications.

The next year I spent in Switzerland where I settled in Montreux on Lake of Geneva; the French speaking part of the country. This exceedingly beautiful region was ideally situated for reaching other parts of the land in order to study the different conditions of the alpine flora, high up in the mountains, using Prof. C. Schroeters' excellent book "Das Pflanzenleben der Alpen" constantly as a guide. A great deal of time was spent along the vineyards, the wineries; several estates with their attractive plant collections were visited among which were the property of Rothschild not far from Geneva, and the Botanical Garden near the

Fig. 3. Dr. Uphof at the age of 7 years.

same city. I became acquainted with Dr. Ernst Wilczek who was Professor of Botany at the University of Lausanne which had a very good Alpine Garden in the mountains near Pont de Nant. Some readers will be interested to hear about my friendship with Henry Correvon, a vigorous author and ambitious grower of alpine plants, who had his place near Geneva.

During that time my parents paid me a visit and took me for some weeks to the northern part of Italy. We greatly enjoyed the Italian lakes, among which were Lago di Como and Lago Magiore with their exquisite backgrounds and beautiful old gardens. We also went for some time to Milano.

Later, after my return to Amsterdam, I went to see the northern half of France and was much of the time in Paris at le Jardin des Plantes of the Muséum d'Histoire Naturelle. I visited the beautiful parks around the Palace of Versailles that were laid out by the famous architect Le Notre under Louis XIV. In this region is also the École d'Horticulture. There was much to be seen and learned at Vilmorin & Andrieux, the world famous seed-growers. Later I visited several parts of Belgium.

The last of my "Wanderjahren," namely 1911, was spent in lovely England. As the reader is well aware, it was my intention to study at the Royal Botanical Garden at Kew, a place that I so often visited in later years. This enormous institution is the Mecca for every botanist, horticulturist and plant lover. Its thousands of plant species in the garden, arboretum and greenhouses; the extensive material in the museums and herbariums; the rich library, have much to offer to the student of systematic and economic botany. There is always courteous help from everyone. I remember the kind assistance and advice I always got from Sir David Prain, and later from Sir Arthur Hill, both Directors of the Institution. In the herbarium I had the help of Dr. Otto Stapf, Dr. T. A. Sprague and other members. I got the help of Dr. L. A. Boodle when doing some research work in the Jodrell Laboratory on Kew Green.

At the Department of Botany of the British Museum for Natural History in London, I became acquainted with Dr. A. R. Rendle, the Curator, and Dr. Yapp, one of the botanists. Every time I visited England, I could not forget the great British geneticist, Prof. William Bateson, Director of the John Innes Horticulturist Institute at Merton not far from Wimbledon. Prof. Bateson and his associates were always eager to show us the newest work in genetics. At the end of the discussions and demonstrations the greatest hospitality was shown. There was an English tea ready and the delicacies that go with it.

There are from England so many other pleasant reminiscences that I would like to relate, but I can not mention everything. I do wish to mention that in Teddington, Middlesex, I got acquainted with Miss Norah M. O'Connor whom I married in February 1912, and must add that we got in 1917 a most charming daughter, christened Bernice, who graduated later from the Washington School of Secretaries, and who became in 1942 Mrs. Harold W. Oliver, Jr., now living in Verona, New Jersey.

I CHOOSE AMERICA

I now decided to look for a final position, either in the Netherlands East Indies, Latin America, or in the United States. I finally decided on the last named country. Through the help of Dr. Charles E. Bessey, Professor of Botany at the University of Nebraska, I secured a position with his son Dr. Ernst A. Bessey, as Curator of the Botanical Garden and Herbarium and was later Instructor of Botany at the Michigan Agricultural College, later Michigan State College.

We sailed on the S.S. Olympic of the White Star Line and toward the end of February 1912 we were met at the railroad station in Lansing, Mich., by Dr. Richard de Zeeuw who was of Dutch descent and who spoke Dutch fluently. Soon I got acquainted with my attractive work in taking charge of the Botanical Garden; in rearranging the over 150,000 herbarium specimens from the old system of Bentham and Hooker to that of Engler and Prantl, to which was added later my course in dendrology. I had my own house built which was presented by my grandmother on my mother's side. It was always stimulating to work with Dr. Ernst Bessey, Head of Department fo Botany and to get the views and opinions of his associates Dr. Richard de Zeeuw, Dr. R. P. Hibbard, plant physiologist, Dr. G. H. Coons, plant pathologist, and Dr. Ruth Allen, a very eminent cytologist.

I always noticed that American students are pleasant to get along with. I liked to teach them and I have to admit that I learned much from them.

In 1913 I became Assistant Professor of Botany and Plant Breeding at the State University of Arizona, and Assistant Botanist and Plant Breeder at the Arizona Agricultural Experiment Station in Tucson, Ariz. Much of the work was done in cooperation with Prof. J. J. Thornber, an expert on the flora of Arizona. He was a very broad-minded man. I took part in the breeding of alfalfa, papago sweet corn, tepary beans, wheat, date palms and sorghum. I also investigated the cold resistance of the spineless cacti. The environment of Tucson with the Carnegie Desert Laboratory was ideal for the study of the interesting xerophytic flora. I also had a chance to visit the northern part of Mexico.

During this time I received the honorary degree of Doctor of Science from Highland College for my scientific work.

One day we were pleasantly surprised by a visit from Frank N. Meyer, famous explorer of the U. S. Department of Agriculture. He introduced an enormous number of useful agricultural and horticultural plants from China through the U. S. Department of Agriculture. He was an Amsterdammer who had studied and worked under Hugo de Vries. He spoke the Dutch language still with ease and we were soon talking about old times in Holland. He was scared that he might have to face the public and give a talk which he dreaded. I assured him that I had not the slightest use for it either and he was relieved. At the introduction garden of the Station he was excited to see so many plants that were sent by him from China. He told me that later in life he would buy his own home where he could live quietly. It is very sad that a few years later he was drowned in the Yuang 'tze Kiang in China.

Toward the end of World War I, we returned to the Netherlands because my parents wanted us to come back for some time. I soon got a position to take charge of the plant breeding work of the Nederlandsche Elitezaad Maatschappij (Netherlands Elite Seed Company) where most of the time I was engaged in the breeding of sugar beets, wheat, rye, peas and dahlias for the inulin content in the tubers. Much

of the work was done with Dr. Klaas Tjebbes who later on went to Sweden.

In 1922 we returned to the U. S., and settled in Florida where we bought a home. I became Professor of Botany and Head of the Department of Biology at Rollins College in Winter Park. This is a society town with all that goes with it. I stayed there twenty years and it was pleasant to work the first three years under president Dr. R. J. Sprague and later under Dr. W. C. Weir, all able administrators. Later the conditions changed and had to be investigated. It is mighty interesting to read the "Rollins Report" in the Bulletin of the Am. Assoc. of Univ. Professors, *19* (nr. 7) : 416-438, 1933. There is also much that is curious to be read about this institution in Prof. J. Rice's book "I Came Out of the Eighteenth Century."

The four months of summer vacation was looked forward to by everyone. We usually went abroad, or to Washington, D. C. In 1924 I was asked by Dr. Mario Calvino, the Director of the Cuban Agricultural Experiment Station in Santiago de las Vegas near Habana, to work out a number of problems during the summer months, including the hydrocyanic acid content of certain varieties of the Cassava. While engaged in this work I became acquainted with Señora Dr. E. Mameli Calvino, the wife of the director who was a brilliant plant physiologist. I also met Dr. Gonzalo M. Fortun, who became later Director of the Station, and Dr. J. T. Roig y Mesa who is thoroughly versed in economic botany. I also met Dr. J. B. Acuña and Dr. S. C. Bruner of the Department of Plant Diseases. They all advised me that I should become acquainted with Dr. Hermano Leon (J. S. Sauhet) of Colegio de la Salle in Vedado, Habana. After meeting this eminent man I found out about his great knowledge of the flora of Cuba, about which he wrote many publications. Ever since, I have kept up correspondence with this fine man.

During the summer months of 1928 and 1929 we were in Washington, D. C., where I acted as Bibliographer of the Tropical Plant Research Foundation under Dr. W. A. Orton, previously known for his work in plant diseases. It was my work to make reports and make a card index in relation to crops that were being grown in the Netherlands East Indies, especially in relation to sugar cane and coffee. Most of the study was done in Dutch publications in the Library of the U. S. Department of Agriculture, the Library of Congress, and of the Pan American Union, where I became later on acquainted with Dr. J. L. Colom, Chief of the Division of Agricultural Cooperation. During that time I watched Dr. Orton studying the Spanish language, and I got the idea of taking courses too in that language—which I took at the Berlitz School. This became useful to me when I later went to Latin American countries. When getting my mail in 1928 at the Netherlands Embassy one day, I was pleasantly surprised with a package that came from Bulgaria. It contained an autographed photograph from His Majesty Boris III, King of Bulgaria with whom I had corresponded for a number of years. He is a lover of natural sciences especially of botany. Several years later when

the King married Princess Giovana of Italy, I also received a photo of the Queen being exactly of the same oval shape and size as the photo of the King. During our stay in Washington we had many pleasant hours at the Netherlands Embassy where we were entertained by the successive Ambassadors Dr. Van Roijen Jonkheer van Haersma de Witt and Dr. Loudon.

The summer of 1930 arrived and we made a trip to Holland to visit my father. My mother had died a few years previously. I was pleased to meet again Professor Hugo de Vries who lived in retirement in Lunteren (Gelderland). I renewed my friendship with Dr. August Chevalier at the Jardin des Plantes in Paris who is an expert on tropical agriculture and of economic plants of the French Colonies. I visited the people at the Botanical Institution in Berlin-Dahlem. I did some studies in the herbarium now largely destroyed during the war. For some time our family was entertained at the Castle of Dr. Fritz Graf van Schwerin in Thyrow. He was for many years President of the Deutsche Dendrologische Gesellschaft (German Dendrological Society) of which I was made Corresponding Member a few years previously. The Count, Countess and their two sons were most charming and entertaining. The Count showed us his extensive estate and above all his widely known collection of trees and shrubs in his park. There were also a number of hybrid *Amaryllis* and *Crinum* species in some of his greenhouses. Later during that vacation I attended the International Botanical Congress at Cambridge, England, and of course visited the folks at Kew.

The summer months of 1932 were spent entirely in Colorado Springs, Colorado, where I could compare my observations on alpine plants with those made in Switzerland. During that year, I received a letter from Prof. H. Harms in Dahlem, asking me to prepare some families for the second edition of Engler und Prantl, Die Natuerlichen Pflanzenfamilien, one of the largest botanical works, to be published in at least forty volumes. Thus far my *Sarraceniaceae* and *Cyrillaceae* have been published while others will follow. In my early days, I had always hoped to own the first edition of this gigantic work but I never imagined that I would be asked to become a co-author of the second edition. With these activities became associated many pleasant memories of friendship with Mr. Wilhelm Engelmann, the publisher of this work, who is a born Hollander from Utrecht.

BULGARIAN VISIT

The year 1936 gave again some notable events. We went first during the summer vacation to Washington, D. C., where we were invited by Dr. Dimitri A. Naoumoff, Ambassador of Bulgaria to receive in name of King Boris III, the Officer Cross of the Bulgarian Order of Civil Merits. During the lunch at the Legation the Ambassador was delighted to hear that we were going to Europe during the summer, and that it was my intention to visit his country Bulgaria. I was invited by the King through a letter of Dr. Ivan Buresch to come to Sofia. I went first

by boat to Holland, hence by the Orient Express via Vienna and Budapest to the capital of Bulgaria. Upon arrival I was soon received by Dr. Ivan Buresch, Director-General of the Royal Biological Collections who introduced me to a number of scientists of the Court including Dr. Nocolai Stojanoff, Botanist to the King and Professor of Botany at the University of Sofia.

During a certain morning an officer approached my room of Hotel Slavienska Beseda handing me a note in German from Dr. Buresch, that this morning he would present me to His Majesty at the Summer Palace in Vrana near Sofia. When passing the guards at the gate, I noticed the King standing at some distance in the park where he was waiting. After introduction, he thanked me for the many things that I had done for him. He took me through the park [Fig. 4] where he showed me his large plant collections in which he took a great pride. The first visit lasted from 9 to 12 o'clock in the morning. I had to see his large rockery gardens which he called "Klein Dahlem" (Small Dahlem). This he laid out when he was young and still a Prince together with his brother Prince Cyril and his sister Princess Eudoxia, under the guidance of Mr. Johann Kellerer, an Austrian who was his horticulturist and to whom the Royal Family was very much attached, already from early childhood. In the collection there was an Orchid; it was a yellow flowering *Orchis sambucina*. I very well remember that King Boris told me he hoped that the plant would still be flowering when I arrived.

After a long trip through the garden and the greenhouses, including a beautiful *Victoria regia* house with tropical water plants, and houses with Orchids which I had the honor to enrich with Orchids later from El Salvador and Guatemala, he finally showed me the palace. There were many pictures and paintings of his youth, all showing his love for the study of nature. The King asked me many questions in an interesting way about Holland and the United States and he told me much about his Bulgaria. He also advised me about the many things I should see when in Istanbul, Turkey. The King is very witty and likes to crack a joke, especially about himself. In botany he is a professional and no layman by any means. Dr. Buresch and Ambassador Naounoff often told me that the King should have been a botanist.

When I left the King promised me that there would be one of his autos available for me to take a trip to the beautiful and wonderful Rilla Mountains and I would spend as his guest a number of days in the interesting Rilla Monastery. On the trip I was accompanied by Dr. Stojanoff who showed me around everywhere. There was an undisturbed nature with an unequalled grandeur. The beautiful forests, the mountain meadows with their Balkan flora were unique, with a background of high mountains everywhere. There is so much that I should mention, but how could I in such a short space. The readers will be interested to know that I noticed masses of flowering wild *Gladiolus illyricus* in the natural meadows. We drove through interesting villages in Macedonia and visited the markets with so many people in their native dresses; we

went along the valley of the Struma; visiting the Government Tobacco Experiment Station, for in this region they grow one of the finest tobaccos. I returned to Sofia after a week.

During the stay in the capital, I was able to see many private collections of the Royal Family among which are the Zoological Museum close to the Palace, containing an unusually fine collection of Balkan birds collected mainly by King Ferdinand who was an outstanding ornithologist. There was also the large Herbarium. On the labels attached to the sheets, I could read that a great number of the plants were collected under the name of the King and earlier ones under the name of Prince

Fig. 4. Dr. Uphof (left), and King Boris III, of Bulgaria (right), in 1936. The King is showing Dr. Uphof the plant collections in the Royal Park at Varna, near Sofia.

Boris. Elsewhere was a separate building with a large collection of insects which was mainly brought together by his father. In still another section of Sofia was the private Zoological Garden. It is a very great pity that these outstanding collections are not sufficiently known abroad.

I was happy to become acquainted with several botanists, most being members of the Bulgarian Botanical Society of which I was made Corresponding Member some years previously. I was among others introduced to Dr. D. Atanasoff, Professor of Plant Pathology at the College of Agriculture, and at that time Minister of Agriculture. He specializes in virus diseases of plants. He studied in the U. S. and in Holland. He spoke excellent Dutch. This was no wonder, because someone told me that the

Bulgarian Minister always spoke Dutch at home as his wife was a Hollander.

One day I was invited by the members of the Bulgarian Academy of Science on an excursion to the State Agricultural Experiment Station not far from Sofia. Here we saw the many experiments that were going on to improve the agricultural conditions of the country.

My journeys in the Balkans were extended to Istanbul, Turkey, and upon my return to Holland, also to Belgrad, Jugoslavia with its botanical institutions, and later several parts of Hungary and Austria were visited. There was time left to see Holland. We motored to many parts of the country.

LATIN AMERICAN VISITS

During the spring of 1938, I received a letter from Don. Walter Deininger asking whether I would like to come to El Salvador where I might be useful in giving advice on a number of agricultural matters. I would be engaged for the summer months by the Asociacion Cafetalera de El Salvador with headquarters in San Salvador, the capital. On the end of May I left New Orleans by one of the steamers of the United Fruit Company and arrived at Puerto Barios, Guatemala. In Guatemala City, the capital I had the pleasure to meet Dr. Mariano Pacheco H., who was at that time Director of Agriculture. He showed me his lovely private collection of plants. The greenhouses were rich in species of Bromeliads, Orchids and Cacti and I regretted again, as in Bulgaria, that such collections are so little known abroad. He spoke excellent French. He also introduced me to the Minister of Agriculture who assured me that everything at the Department was at my disposal. I met Don Juan Antonio Alvarado, the author of two volumes of "Tratado de Caficultura Practica."

After some days I went by auto to El Salvador. In the capital San Salvador I was met my Don Walter Deininger and his wife. They have large coffee and sugar plantations and many herds of cattle. Frequently I was invited to their home and had the pleasure of meeting many prominent people of the country. Soon I was introduced to the officials of the Cafetalera—to Don Roberto Lopez Harrison the administrator; to Don Hector Herrera who was also President of the Banco Hipotecario; and to Don Agustin Alfaro President of the Cafetalera. There was also Don H. de Sola one of the wealthiest persons of the Republic. He has extensive coffee plantations, did much business with foreign lands and was Consul of the Netherlands. He did much for me.

Soon I got to work at the laboratory of the Cafetalera in Santa Teela. I had to work out the distribution of the dreaded root disease of the coffee trees. I found that it was caused by a *Rosellinia*. This work brought me by auto, train or on mule back to all the important coffee growing districts and towns. Further I was asked to make some observations as to the possibility of growing new crops that could be grown at various altitudes and with which they could start gradually experi-

menting later, for El Salvador is a one-crop country, its interest being mainly in coffee. They asked me also to write up an outline with suggestions of courses that might be given in agriculture at the Universidad Nacional.

It seemed that the El Salvadoreans could not do enough for me; everywhere I was invited to parties. I had to visit their fincas (coffee plantations), had to go through their collections (hobbies) and see their libraries. Through an invitation of Don Hector Herrera, I was enabled to attend a banquet and ball at the Country Club where there were the members of the diplomatic corps. There I had interesting talks with the Vice President of the Republic and with the Ministers of Foreign Affairs, of War and of Agriculture. The better classes, as in Guatemala, practically all know English, French and German in which they can converse easily. They are cultured and widely travelled. I regretted to leave this hospitable El Salvador. Upon my way back to Florida, I again visited different parts of Guatemala and some sections of Honduras, especially the banana plantations.

Fig. 5. Dr. Uphof at the age of 65 years.

When World War II broke out, I became in 1942 Economic Botanist to the Board of Economic Warfare in Washington, D. C., where I had to make reports and give advice about rubber producing plants native to the New World, and of some other crops that might be of some value during the conflict. Toward the end of the war, I did similar work for the Board of the Netherlands Indies under Dutch officials in New York City.

After the war, we settled in Tampa, Florida, where we bought a

home and alternated the work at the University of Tampa with activities in Guatemala. To this Central American republic, I was invited by Don W. E. Dieseldorff, prominent plantation owner in Coban in the Departemento of Alto Verapaz. I reached this city from Tampa by plane. The gentleman has in this section of the country numerous plantations. Most were planted with coffee trees; others with maize and some with allspice. In the warm regions, especially in Cubilquitz were plantations with pepper vines (*Piper nigrum*), cardamon and nutmeg. Others were planted with cacao trees. This demanded from me many interesting trips, most were undertaken on mule back through beautiful Guatemalan mountain scenery; through virgin forests; along rivers and lovely mountain lakes. During these trips there were always species of *Zephyranthes* to be noticed, usually growing in extensive groups. Often I could enjoy the Hybrid *Amaryllis* grown in the private gardens. Along the roads, we frequently noticed Indians balancing large baskets on their heads, containing fruits and vegetables and often there were one or more bunches of *Amaryllis* flowers that were to be sold on the markets of Coban, San Pedro or San Christobal; for the Guatemalans are great lovers of flowers.

Everywhere in the mountains there were hosts of species of Orchids, growing as epiphytes against the trees. Many had gorgeous flowers including species of *Stanhopea, Epidendrum, Oncidium, Odontoglossum, Maxillaria, Lycaste* and numerous others. *Lycaste Skinneri* (not *Cattleya Skinneri* as some claim) is the state flower of the country. These all excited me very much, as I knew many from the collections in Europe. Equally as interesting were the many species of bromeliads; some were very tall, growing likewise against the trees.

My research work remains to be mentioned briefly. I published my papers in some American journals, and also in British, Dutch, French, German, Austrian, Spanish, Italian, and Japanese publications. As for the Japanese, I wrote the manuscript in English or German and through the kind help of Prof. Tyozaburô Tanaka in Japan they were translated into his own language.

HOBBIES

Though naturally, I consider botany my hobby, I have also some others as well. I am a stamp collector, specializing in stamps of the Netherlands which I keep complete by adding new issues. Further I have a collection of minerals, among which I have several uranium and radium ores; they all fit in a collection of specimens of around 2 x 3 inches in size. I also collect coins namely Ancient Roman coins and also crowns under which are understood silver coins about the size of a silver dollar of which I have many.

I have a fine private botanical library, and I have not overlooked the older works, like those of Fuchs, Clusius, Linnaeus, Commelin, Boerhaave, Tournefort, Munting, Chabraeus, Barrelier and others, published between 1512 and 1800.

EDITORIAL NOTE.—Dr. Uphof has published no less than 335 articles in the field of plant science. This bibliography is too long for reproduction here, but Dr. Uphof will be pleased to send the 11-page mimeographed list of titles to anyone requesting it. Dr. Uphof's address is 2903 San Nicholas Street, Tampa, Florida.

CORLISS' "HEMEROCALLIS—THE PERENNIAL SUPREME"[1]

W. R. BALLARD, *Maryland*

This is the latest addition to the relatively few comprehensive publications devoted to this popular perennial. The historical section gives a broad picture of the development of the daylily from the first recorded hybrid by Yeld down to the host of hopeful contemporary growers of seedlings.

Analysis of the leading varieties contending for popular favor is considered from the standpoint of regional performance and needs. In a country as large as this with such varying climatic conditions, it is essential to evaluate varieties in the light of how they succeed in each distinct area. Development has been rapid in some sections but in others little is known about the remarkable improvement which has been made in this flower in recent years.

The cultural directions given for the daylily are adequate. Fortunately the adaptability of this showy flower is such that it presents few problems in its culture. Gardeners will appreciate the suggestions made as to the use of the daylily for landscape effect both in the home grounds and in public plantings.

Considerable attention is devoted to the use of the daylily in flower arrangements. This phase of its use has not developed to the extent that its value warrants. It is to be hoped that a recognition of its merits will stimulate greater efforts to develop varieties whose flowers remain in good condition for arrangements made for use in the evening.

This book is notable for its fine illustrations as might be expected of an author who is also an accomplished photographer. These are further enhanced by the high quality of the paper upon which they are printed. Those who are interested in photographing the daylilies in their own garden and especially those who wish to have pictures of their own origi-

[Ballard—CORLISS' "THE PERENNIAL SUPREME," continued on page 31.]

[1] *Hemerocallis—The Perennial Supreme*, by Philip G. Corliss, M.D., 1st ed. Foreword by Sydney B. Mitchell. San Francisco, Calif. 1951. $7.50. This book may be obtained from the author at Somerton, Ariz.

Hybrid *Amaryllis* Display at the Cleveland Flower Show, 1951

Plate 2

I. REGIONAL ACTIVITY AND EXHIBITIONS

CLEVELAND FLOWER SHOW—AMARYLLIS DISPLAY 1951

THOMAS R. MANLEY, *Horticulturist*
The Garden Center of Greater Cleveland and Western Reserve University

Public enthusiasm for the initial display of Royal Dutch Hybrid Amaryllis in the 1950 Cleveland Flower Show as staged by the Garden Center of Greater Cleveland and Western Reserve University, caused the show committee to provide one of the feature locations for 1951. Thus a 150-foot frontage with a depth of 12 feet was staged with amaryllis [Plate 2]. Over 200 8-inch pots were used amid ferns and Hahn's ivy. Cultural methods this season provided most plants with four to six leaves which added to the display, screening the nakedness of the scapes.

The background of arborvitae, *Thuya occidentalis*, screened the walls while forced Morrow Honeysuckle, *Lonicera morrowii*, with pale green foliage and yellow flowers, and rosy Tartarian honeysuckle, *Lonicera tartarica rosea* with rose flowers, 6 to 8 feet tall, lightened the deep color of the arborvitae.

Central figure of the display was a life-sized nude in bronze, standing amid ferns and white amaryllis. Blending from white toward the sides of the display were white amaryllis striped with pink and scarlet, featuring the varieties KING OF THE STRIPES (Warmenhoven) and STRIPED BEAUTY (Warmenhoven). Blending to pink and rose were PINK PERFECTION (Ludwig), FANTASY (Ludwig), DORIS LILIUM (Ludwig) and VIOLETTA (Warmenhoven). Blendings of salmon, orange scarlet, scarlet to red, with deep wine red highlighting the ends were provided by the varieties MYSTERIE (Warmenhoven), RED MASTER (Warmenhoven) and MORENO (Warmenhoven) with tall scapes bearing huge flowers.

The foreground varieties featured the miniature form *xAmaryllis* "gracilis" (DeGraaff strain) causing much comment due to their small size and unique form. The show was attended by 186,000 people and once again by popular acclaim designated the amaryllis display as one of the highlights of the show.

The 1951 AMARYLLIS QUEEN of New Orleans. See legend bottom opposite page.

Plate 3

[Ballard—CORLISS' "THE PERENNIAL SUPREME," continued from page 27.]

nations, will be interested in the helpful suggestions for staging and taking photographs.

Lists of recommended varieties are always interesting but in a group undergoing such a rapid evolution as is the daylily they soon lose their value. Dr. Corliss' lists will no doubt prove of value to growers when selecting new varieties if due allowance is made for climatic variations and for personal tastes. The lists of hybridizers and gardens where new varieties may be seen in bloom are valuable. Fortunate are the gardeners who have the privilege of seeing new varieties in bloom and growing under similar conditions to those existing in their own garden. This is a much more satisfactory way to make selections than to try to figure out from printed descriptions what varieties will make valuable additions to one's collection.

This attractive book by Dr. Corliss will be welcomed by all those interested in the daylily. It gives in simple, non-technical language information which should do much to increase in readers an awareness of the modern development in the daylily, and to stimulate interest in its greater use.

NEW ORLEANS AMARYLLIS SHOW, 1951

Mrs. W. D. Morton, Jr., *Pres. Garden Circle, New Orleans*

The Third Official Amaryllis Show of New Orleans was again staged on the entire ground floor at the Jewish Community Center, 5342 St. Charles Ave., on March 31 and April 1, 1951. The Amaryllis were never lovelier. New Orleans Garden Clubs were represented in both artistic arrangements and bloom exhibits. The awards were made by six accredited Judges—two silver cups, five APLS awards, two Club ribbons, and ten additional prizes.

On Saturday afternoon Miss Gayle Mackenroth, daughter of Mr. and Mrs. Richard A. Mackenroth, was crowned the 1951 Official Amaryllis Queen of New Orleans by Park Commissioner Victor H. Schiro [Plate 3]. Her maids were Misses Jimmy Mackenroth and Janice Collins. Miss Marilyn Favret, last year's Queen, presented Miss Mackenroth and her Court of Maids.

Plate 3. (See opposite page.) The 1951 Amaryllis Queen of New Orleans, Miss Gayle Mackenroth (center) is crowned by Park Commissioner Victor H. Schiro (rear, left) during the 1951 ceremonies. Her maids are Miss Jimmy Mackenroth (front, left), and Miss Janice Collins (front, right). Miss Marilyn Favret, last year's Queen (rear, right).

1951 ORLANDO-WINTER PARK HEMEROCALLIS SHOW

WYNDHAM HAYWARD, *Southeast Regional Vice President, Winter Park, Florida*

The Mead Botanical Garden in Orlando-Winter Park was the scene of its main Daylily show of the season May 27, 1951, when Central Florida Hemerocallis growers exhibited their choicest blooms for the delight of the good-sized attendance of flower lovers.

There were half a dozen growers and hybridizers who showed their blooms, and among them were some of the nation's finest new hybrids of the Daylily, varieties which are expected to take high rank as daylily favorites of the future.

Outstanding among the flowers on view were some of the named varieties of R .W. Wheeler, Winter Park, nationally known and recognized breeder of Hemerocallis, and his notable group included his sensational purple-black RAVEN, the lovely yellow ARLA, the showy orange NARANJA, the huge ruffled SHOW GIRL, the wine colored BACCHUS and AMHERST, and his pastel novelty LILAC TIME.

Other varieties that he showed were MARTHA WASHINGTON, SABRINA, BRASSY SUN, TIARA, VEGA, DEMI-TASSE, TOM THUMB, TOMOKA, MOHAWK, HAILE SELASSIE, VICTORIA, PAUL IHRIG, BALLET GIRL, SCORPIO, OHRED, RUBY SUPREME, SCARLET SUNSET, BERCEUSE, GANYMEDE, HAZEL SAWYER, BILLIE BURKE, BRACKEL, MING TOY, CHANTICLEER, TYROL, BRANDYWINE, BLACKHAWK, ROYAL LADY. He also showed 44 unnamed seedlings.

Mrs. C. M. Slaughter of Orlando showed 46 seedlings, and the named variety FRANCES WYNN. Mrs. E. W. Landis of Deland showed 41 seedlings. Mrs. Robert Wall of Clarcona exhibited OLD ROSE, FRANDERS, KANAPAHA, PATRICIA, LIMELIGHT, PEACH BLUSH, BIJOU, BLANCHE HOOKER and 18 seedlings. Frank Vasku of Winter Park showed 30 unnamed seedlings in a variety of shades.

Soper's Gardens presented a colorful display including many of the Russell varieties of daylilies from Texas, including ELAINE RUSSELL, JOY RUSSELL, FLAMING SWORD, EL CAPITAN, MARQUITA, LINDA, EVANGELINE, HYPERION, KATHLEEN, CITY OF SUMTER, GOLD EMPIRE, SAN PEDRO, BAGUETTE, OPHIR, CHINA ROSE, DAWN OF DAY, QUEEN OF MONTEREY, ON TOUR, BATTLE CRY, TWINKLE, BABY TEARS, TEJAS, COLLEEN, RUSSELL'S MINUET, MARY GRACE, THE REVIEWER, BURNING STAR, PERFECT DAY, SPRING DELIGHT, RED GEM, LEST YOU FORGET, PLAY TIME, HAVEN, WESTERN JEWEL, LONE SYMBOL, GOLDEN BELL, PATRICIA, INDIAN DANCE, GYPSY, LITTLE BLOSSOM and MYKAWA.

Triple F Gardens of Orlando, operated by Mr. and Mrs. Gerald F. Knight, offered 15 seedlings, and named variety flowers including GYPSY, AMARYLLIS, CALYPSO, BRANDYWINE, HAILE SELASSIE, BABETTE, PRISCILLA,

Bay State, Crown of Gold, Dr. Regel, Florham, Clarice, Ophir,, Naranja, Ballet Girl, Hyperion, Sweetbriar, Confucious, Mrs. Tigert, Skylark, Princess, Ajax, Queen of May, Cinnabar, Baronet, Prima Donna, Purple Waters, Spring Parade, Ruby Supreme, Bijou and Sylvia. Also their own introductions, Gallant Knight and Lena Tyson.

Wyndham Hayward of Lakemont Gardens, Winter Park showed several of his latest varieties, including the new red, Hayward's Salome, the new yellows, Betty Grable and Paula Wagner, and others of his hybridizing: Glamour Girl, E. W. Yandre, Salmon Rose, Emperor Jones, Clarence, Minnie, Zulu Boy, Florida, Sahara Sunset, Pretty Quadroon, and varieties of other breeders as Ruby Supreme, Duchess of Windsor, Caballero, Cherry, Chisca, June Boissier, Golden West, Star of Gold, Rajah, Golden Glow, Black Hills, The Director, Patricia, Purple Sage, Bertrand Farr, Rosy Day, Bicolor, Lidice, Purple Waters, Georgia, Rose Gem, Rubaiyat, Dr. Stout, Princess.

GARDEN VISITS, 1951

Philip G. Corliss, M.D., *Southwest Regional Vice President*
Somerton, Arizona

In addition to the gardens visited during the Joint Meeting described elsewhere, I enjoyed a morning with my cameras at the wonderful gardens on the grounds of the Huntington Museum in San Marino, California. Two of the gardens are particularly outstanding: the cactus garden and the Oriental garden. The rose gardens are outstanding, and in season, the rhododendrons and azaleas are notable. The climate here is favorable to outdoor orchid culture, and large beds of cymbidiums were in full bloom.

In early June I attended the annual meeting of The Hemerocallis Society in Little Rock, Arkansas. Mr. Joseph House, President of the Society, and Mr. Walter Vestal, noted nurseryman of Little Rock, were hosts to the meeting, which attracted more than two hundred members from all parts of the country. At Mr. House's country place, "Flower Acres," there were more than three acres of hemerocallis seedlings in full bloom. Mr. Vestal had peak bloom on hundreds of guest plants of named varieties and his own and Mr. House's seedlings at his home garden in North Little Rock.

On the return trip from Little Rock I spoke to the Houston (Texas) Bulb and Amaryllis Society after a pleasant day visiting some of the fine Houston gardens. Noteworthy were the gardens of Mrs. Robert Schlumpf, past Hemerocallis chairman for the Texas Garden Clubs; Mrs. G. B. Reneau, landscape consultant; and Mrs. J. Willis Slaughter,

whose annual Houston Bulb Mart has for many years spread interest in amaryllids and other bulbs.

Mrs. Corliss and I left Arizona on the morning of July 4th with the hope of reaching Boston in time for the regional meeting of Region 4 of The Hemerocallis Society, which had been advanced to July 13 and 14. We covered 3500 miles in eight days, and spent five of the eight days in gardens of hemerocallis growers. Most important stops were with the Allen Wilds in Sarcoxie, Missouri; F. E. Rice and D. N. McKeithan in Bartlesville, Oklahoma; and Mrs. J. F. Emigholz, in Cincinnati, Ohio. Mr. Wild introduces the daylilies of Mr. Lemoine Bechtold and Mr. Carl Carpenter and grows the best of many other hybridizers. The Bartlesville gardens have contained most of the best new introductions for many years. Mrs. Emigholz is one of the most important hemerocallis hybridizers, and her introductions have long been favorably known.

An interesting stop was at Eastford, Connecticut, to see and photograph the new hybrid gloxinias of Albert Buell.

The New England meeting was well attended and blessed with good weather. The gardens visited will be those which will be seen at the annual meeting of The Hemerocallis Society in 1952, and included those of Mrs. Thomas Nesmith, Mr. Harold Knowlton, Mrs. Irving Fraim, Mr. Orville Howe, and Mr. Stedman Buttrick.

On July 28th Mr. Harold Knowlton took me to Professor Stephen Hamblin's interesting garden on Cape Cod, where we saw his tall hybrid hemerocallis. These are seedlings of two crosses: *H. altissima* × HYPERION and *H. altissima* × *H. fulva* (red clone). It is not certain whether this *H. altissima* is the same as Dr. Stout's *H. exalta*. Among the seedlings of the first cross are many recurved yellow flowers of nice form. The offspring of the second cross show a predominance of the red color (yellow is generally thought to be dominant in hemerocallis breeding).

The outstanding characteristics of all of these hybrids were their height and the erect nature of the scapes. The flower scapes were from five to seven feet high, and there was not a single ascending or horizontal scape—all the more remarkable because of the light soil and hilly garden in which they were growing. The bloom was rather late, but the branching and number of buds were remarkable. I felt that many of the hybrids especially the HYPERION seedlings were night bloomers, although Prof. Hamblin had not thought so.

On my return trip to the west, I visited the charming New Hampshire garden of Mr. Howard Andros at Walpole, and the large plantings at Mr. Richard Johnson's Shrewsbury Gardens in Cuttingsville, Vermont. Hemerocallis were thriving in both locations.

Wayside Gardens in Ohio, and the splendid gardens near Chicago of Mr. David Hall and Mr. Elmer Claar were also the object of study. The Kraus varieties at Faribault, Minnesota, were a bit past their peak, but still interesting.

A notable garden was that of Mr. Lemoine Bechtold in Denver. The

named varieties were past, but the seedling garden was in heavy bloom. His growing season is short, but Mr. Bechtold has produced some of our finest hemerocallis varieties in Denver.

In Portland, Oregon, I enjoyed making the annual garden tour with the Portland Men's Garden Club (largest in the world), one of the highlights of the tour being a demonstration of the new Kraus hardy chrysanthemums in the display gardens at Lewis and Clark University, with Dr. E. J. Kraus for guide.

My first object on reaching San Francisco was to see if the hemerocallis in the Fleishhacker garden were blooming in their fog and shade—they were!

[HERBERT MEDAL CITATION, continued from page 6.]

It should be noted that during the 14 years since 1938, the correctness of Dr. Uphof's findings have been widely recognized, and these have stimulated renewed interest in the group. It is interesting, in this connection, to note that no less than 9 new *Amaryllis* L., species have been proposed since that date—*Amaryllis kromeri* Worsley (Brasil), *Amaryllis aglaiae* Castellanos (Argentina and Bolivia), *Amaryllis ferreyrae* Traub (Peru), *Amaryllis fosteri* Traub (Brasil), *Amaryllis espiritensis* Traub (Brasil), *Amaryllis vanleestenii* Traub (Surinam), *Amaryllis viridorchida* Traub (Brasil), *Amaryllis oconequensis* Traub (Peru), and *Amaryllis maracasa* Traub (Brasil).

In recognition of his important contributions toward the advancement of the *Amaryllidaceae*, the 1952 William Herbert Medal has been appropriately awarded to Dr. Uphof. It goes to him with the good wishes of all who know him as a reward for an important job well done."

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 182.]

papillose, both the stamens and style yellow; capsule not seen by me.—Flowering in November in rocky woods at Teneria, alt. 3000 m., Bolivia (Herzog no. 2486).

Zephyranthes cubensis Urb., Symb. Antill. 5: 292. 1907.—Related to *Z. carinata* Herb. (Bot. Mag., pl. 2594, from Mexico), but differing especially in its leaves being 2—3 times broader, the spathe mostly surpassing the ovary, the corolla half again as long, the tube of the perianth 3 times longer, 10—14 mm. long. *Z. rosea Herb.* differs in its much broader leaves, shorter spathe, smaller perianth, and more or less globose ovary.

Zephyranthes porphyrospila Holmberg in Fedde, Repert. 3: 94—95. 1906.—Argentina (San Luis along the shores of Rio 5° ?—Formosa?) Cultivated in Buenos Aires, blooming on the 20th day of January. This species resembles slightly *Z. robusta* (Herb.) Baker. It differs, however,

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 98.]

Alstroemeria pelegrina L., after Feuillée, 1714.

Plate 4

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

A REVIEW OF THE GENUS ALSTROEMERIA

J. C. Th. Uphof, *Tampa, Florida*

The genus *Alstroemeria* forms an extremely interesting group which is placed with the Amaryllids by earlier authorities, but is recognized as a genus in the family *Alstroemeriaceae* by Hutchison (Fam. Flow. Plants, vol. 2, 1934). In recent years *Alstroemeria* species have become important in ornamental horticulture.

The name was founded by Carolus Linnaeus[1] who dedicated it to his friend Alstroemer. In his "Amoenitatis Academicae" he mentions three species—*A. pelegrina*, *A. ligtu* and *A. salsilla*. The last named has been transferred to the genus *Bomarea*. Linnaeus presents a rough illustration of the first species on page 247 of his work.

These species had been described by Père Feuillée about half a century previously in his interesting book on South America.[2] Apparently Linnaeus obtained seeds from this missionary through Alstroemer via Cadiz.

Père Feuillée described these three plants under the name of *Hemerocallis*. His descriptions which were in French were for those times quite detailed, although they are not up to the present requirements of a modern morphological description. The three plates are clear and the plate of *A. pelegrina* is here reproduced [Plant Life plate 4], since it has some historical value in the study of this genus.

The first species mentioned by Feuillée is given the name of "Hemerocallis floribus purpuracentibus striatis vulgò Ligtu." He illustrates the plant in plate IV of his work. This is the second species recognized by Linnaeus which he calls *A. ligtu*. *Feuillée* states at the end of his description that this plant is found along streams. He observed them along the river that passes through the center of the city of Conception in the Kingdom of Chile.

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[1]Carolus Linnaeus, Plantae Alstroemeria, in Amoenitatis Academicae. Tom. VI: 247-262, Upsalae, 1762.

[2]R. P. Feuillée, Journal des Observations physiques, matématiques et botaniques. Tom. II: 710-714, Pl. IV, V, VI. Paris, 1714.

The second species he names "Hemerocallis floribus purpurascentibus, maculatis vulgò Pelegrina," with an illustration in Plate V. It was this species to which Linnaeus gave the name of *Alstroemeria pelegrina* and of which he too gives an illustration in his "Amoenitatis Academicae." In the second edition of his "Species Plantarum"[3] we find this species mentioned first. This species is therefore the type of the genus. Here I wish to add, however, that in my personal copy of "Species Plantarum" the two names are spelled *pelegina* and *Ligta*. They are no doubt printer's mistakes. At the time Père Feuillée visited Chile this species might have been cultivated by the natives, for he states that the flowers of the plant deserve on account of their beauty a place in the gardens of the Incas and likely he would have seen them there at the right season, if he had lived there at that time. Feuillée is well aware of some of the morphological characteristics of the thickened roots. He mentions that the "Hemerocallis" which he described here are like a bunch of turnips. "The Spaniards of Peru" he says "have given this flower the name of Pelegrina, which means exquisite." They are found on a mountain in the North of Lima, a mile distant from this city."

The third species indicated by Feuillée is "Hemerocallis scandens, floribus purpureis vulgò Salsilla." Linnaeus gave it the name of *Alstroemeria salsilla* which was later on transferred by Herbert to the genus *Bomarea*.[4]

It should be noted that Linnaeus used the vernacular names that were cited by Feuillée.

There is no doubt as to what is understood under *A. pelegrina* L., as the type species, though the name is occasionally written as *A. peregrina* Ruiz et Pav., in fact William Herbert gives this same name. There is, however, some confusion as to what is understood under *A. ligtu* L., a species which at times has been confused with *A. caryophyllaea* Jacq., by Linnaeus' son and others. Herbert was also aware of this fact when he states on page 92 with the description of *A. ligtu*[5]: "The name was by a great and unaccountable error in the Bot. Mag.[6] applied to a tropical plant, in no manner resembling it, which has been cultivated under a wrong name, being properly *A. caryophyllaea* of Jacquin." Under the description of *A. caryophyllaea* he explains, "This plant is generally known to cultivators by the erroneous name of "ligtu," given through great inattention by Mr. Curtis, for it has no affinity to the "ligtu" of Feuillée which he states is a Chilean plant." There is also evidence that *A. ligtu* has been mistaken for other species. This may be of interest since it is one of the earliest known species.

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[3]Carolus Linnaeus, Species Plantarum. ed. sec. Tom. I: 461-462, Holmiae, 1762.
[4]William Herbert. Amaryllidaceae. 110 London, 1837.
[5]William Herbert. Amaryllidaceae. 91 London, 1837.
[6]He means no doubt Curtis Botanical Magazine t. 125,

Ruiz and Pavon[7] in a monumental work about the flora of Peru and Chile in 1802, mention 23 species. In this lovely folio work beautiful illustrations are included. Among their Alstroemerias are seventeen species that are now transferred to the genus *Bomarea* in accordance with the proposal of Mirbel[8] who maintained that this genus differs from *Alstroemeria* by the division of the perianth of which the exterior members are not reversed; by the stamens which are straight and the capsule which is rounded and flattened at the base.

Mirbel, according to Herbert, was on the right track, but, as he stated, had not laid hold of the real differences.

Herbert[9] recognized 29 species; among these we find a number of varieties. There are in this work a number of plates showing illustrations of a number of *Alstroemeria* species. The nomenclature he follows in some instances is different from that recognized at the present. He came to the conclusion that the variability among some of the species was of such a nature that it was difficult to put them under a proper arrangement. Herbert places the genus in the *Alstroemeriaeformes*, a part of the sub-order *Hypoxideae*. These *Alstroemeriaeformes* were, according to him, characterized by sepals and petals not respectively uniform and with petaline filaments excelling. This group included *Chaeradotia* Herb., *Alstroemeria* L., *Collania* Herb., *Sphaerine* Herb., and *Bomarea* Mirb. He divided the genus *Alstroemeria* into nine groups, without giving these groups scientific names. His grouping may serve as a basis for the foundation of subgenera by a future monographer of this genus.

Rafinesque[10] in 1836 proposed the genus *Lilaria*, with *A. psittacina* Lehm. as the type. When describing *Priopetalum* another transfer from *Alstroemeria*, he states: "While de G. Amaryllis has undergone such a revision and division the akin G. Alstroemeria has been left untouched, although presenting striking anomalies, I therefore present this end the 2 next reformed Genera out of it, but there are probably more."

Herbert proposed the new genera *Collania* and *Sphaerine* by the transfer of species from *Alstroemeria*. In many modern works these two genera have usually been united with *Bomarea*, including the work of Pax and Hoffmann.[11] Apparently the boundaries of the genus *Bomarea* are far more liberal than those of *Alstroemeria*. Kraenzlin is of the same opinion when he states that the limitation of the species with *Alstroemeria* is too narrow and with *Bomarea* they are too broad.[12]

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[7]Hippolyte Ruiz et Josepho Pavon. Flora Peruviana et Chilensis. Tom. III. Madrid, 1802.

[8]C. F. Brisseau Mirbel, Histoire Naturelle Géécrale et Particulière dès Plantes. Tom. IX: 71-72, Paris, 1804.

[9]William Herbert, Amaryllidaceae. 56, 66, 88-103, 396-397. London, 1837.

[10]C. S. Rafinesque, Flora Telluriana. 4: 34-35, Philadelphia, 1836.

[11]F. Pax und K. Hoffmann. Amaryllidaceae, in Engler und Prantl. Die Naturlichen Pflanzenfamilien. Band 15a: 425, Leipzig, 1930.

[12]Fr. Kranzlin. Amaryllidaceae quaedam novae v. criticae. Beibl. Bot. Jahrb. Nr. 112: 1-7. Band 50, 1913.

Since the publication of Herbert's monograph, many new species of *Alstroemeria* have been discovered and described. Kunth[13] recognized 40 species. Baker[14] records 44 species in his work on the Amaryllids. This work has become the starting point upon which a further study of the Amaryllids is based and therefore also of the genus *Alstroemeria*. In his key, he divides the species of *Alstroemeria* into rather artificial groups, namely Brazilian species, of which he distinguishes 20, and the Chilean species, including 24 species. Even at that time this division of all these known species was not correct, because there were Alstroemerias known from other parts of South America as well. The rest of his key is based mainly on the characters of the leaves and in a few instances on those of the umbel, the flower cluster, whether this is simple or compound. It can be readily understood that in a great many instances it is rather hard to identify species from the two localities alone, namely from Brazil or Chile. It should be noted that the habitat of the type species *A. pelegrina* L., which was originally indicated by Father Feuillée to come from a mountain north of Lima is indicated by Baker as "Hab. Chile, near Valparaiso &c."

Since 1888, 18 species have been proposed as new. The principal contributions came for Philippi and Kraenzlin. It is to be regretted that the description of a number of species is based on very flimsy and incomplete type material.

The present writer feels that a thorough monograph of this interesting genus is very much needed, but for such an effort, one needs to examine the original type specimens that are scattered in different herbaria of many countries. In these troublous times it is not possible to produce the needed monograph.

A well balanced monograph is also necessary from the standpoint of species descriptions. The descriptions of some species are too brief and incomplete and can hardly be sufficient, whereas those by others are very extensive, giving many interesting facts, also in relation to locality and distribution. There are furthermore a number of species whose relationship to others has not been discussed and it is difficult to determine this relationship when we have to judge from some of the descriptions alone.

GEOGRAPHICAL DISTRIBUTION AND ECOLOGICAL RELATIONSHIPS

As far as known, all *Alstroemeria* species are native to South America whereas those of the related genus *Bomarea* extend from this Continent through Central America into the southern half of Mexico. This vast area has not been intensively explored. No doubt, still more *Alstroemeria* species will be discovered.

Up to the present, *Alstroemeria* species have been described from

[13] K. S. Kunth. Enumeratio Plantarum omnium cognitarum secundum familias naturales disposita. Tom. V: 758-781, Stuttgart, 1850.

[14] J. G. Baker. Handbook of the Amaryllideae, 153-162 London. 1888.

Peru, Chile, Brazil, Ecuador, Paraguay, Bolivia, Argentina; some have been recorded as far south as Patagonia. No plants have been mentioned from Colombia, Venezuela and the Guianas, though there is no reason to believe that they do not occur in these countries.

Apparently the center of distribution of the genus is Chile and adjacent territory. Some species have a wide distribution like *A. pelegrina* L. and *A. ligtu;* others are apparently endemic, among which are included *A. patagonica* Phil., and *A. nana* Rendle.

There are species that prefer swamps and marshy localities of the tropical zone, like *A. campaniflora* Hand.-Mazzet., from Brazil. *A. piauhyensis* Gard., seems to prefer shady woods, originally known from Pianhy, Brazil, whereas *A. plantaginea* Mart., was described from high hills of Minas Geraes. There are others that have adapted themselves to the desert regions of Atacama, Chile, among which are included *A. polyphylla* Phil., and *A. graminea* Phil. We notice that *A. nana* Rendle occurs along the slopes of Mt. Frias and the shingle beach of Lake Argentina in Patagonia. Of unusual ecological interest is *A. pygmaea* Herb., which is a high andean representative and likewise *A. Fiebrigiana* Kraenzl., which was originally described from rocky slopes in Southern Bolivia at an elevation of 3700 meters above sea-level.

DIAGNOSIS OF THE GENUS **ALSTROEMERIA**

Herbaceous perennials with rootstock or root-tubers. Roots thickened, sometimes fibrous, often containing a considerable amount of starch. Stems from 3 to 4 feet long (*A. brasiliensis*) to not more than an inch (*A. parvula*) or hardly visible above the surface (*A. pygmaea*). Leaves turned upside down or resupinate, due to the twisting of the base. Leafblade linear, linear-subulate, lanceolate to oblong-spathulate; those on sterile stems being better developed than on those that bear the flowers. Leafbase more or less sessile. Flowers surrounded by bracts, united into umbels or umbel-like inflorescenses, from 2 to 3 flowered (*A. pauperula*) to 10 to 30 flowered (*A. aurantiaca*), seldom solitary (*A. pygmaea*). Bracts linear (*A. versicolor*) to oblong-spathulate (*A. chorillensis*); very minute (*A. apertiflora*) to large (*A. caryophyllea*). Flowers brightly colored, often spotted, more or less zygomorphic or irregular; the lower segment of the inner cycle differing in shape from the other two members as to size and coloring. The three segments of the outer cycle differing in shape from the three in the center. Perianth tube wanting; all segments being free. Stamens somewhat declinate, adnate to the lower part of the segments; frequently unequal; as long as the limb (*A. plantaginea, A. Burchellii*) or shorter (*A. platyphylla, A. violacea*). Filaments filiform; anthers small oblong, attached by the base. Ovary inversely conical, 3-celled. Each cell containing many superimposed ovules. Style filiform; stigma separated about half way down into three parts or lobes. Fruit a dehiscent, loculicidally 3-valved capsule, umbonate toward the apex. Seeds globose.

DESCRIPTION OF THE SPECIES

[Complete descriptions in English of the species preceded by the asterisk (*) are given in the text. The reader is referred to Baker, Handbook of the Amarylliae (1888), for the descriptions in English of the other species.]

1. *plantaginea*
2. *isabellina*
3. *stenopetala*
*4. *radula*
5. *cunea*
6. *gardneri*
7. *platyphylla*
8. *longistyla*
9. *apertiflora*
*10. *malmeana*
11. *sellowiana*
12. *zamoides*
13. *brasiliensis*
*14. *chapadensis*
15. *burchellii*
*16. *campaniflora*
17. *caryophyllaca*
18. *monticola*
*19. *hassleriana*
20. *foliosa*
21. *piauhyensis*
22. *pulchella*
*23. *damaziana*
*24. *regnelliana*
25. *scaberula*
26. *longistaminea*
27. *inodora*
*28. *insignis*
29. *pygmaea*
30. *revoluta*
31. *versicolor*
*32. *fiebrigiana*
33. *inconspicua*
34. *nivalis*
35. *paupercula*
36. *rosea*
37. *araucana*
38. *volckmannii*
39. *violacea*
40. *ligtu*
41. *parvula*
42. *nubigena*
43. *philippii*
44. *pelegrina*
45. *gayana*
46. *haemantha*
47. *aurantiaca*
*48. *bakeri*
49. *venustula*
50. *lineatiflora*
*51. *pavoniana*
52. *chorillensis*
53. *crocea*
54. *spathulata*
55. *crispata*
*56. *sotoana*
*57. *patagonica*
*58. *nana*
*59. *polyphylla*
*60. *modesta*
*61. *graminea*
*62. *amazonica*

1. ALSTROEMERIA PLANTAGINEA Mart. in Roem. et Schultes Syst. VII. 739; Herbert, Amaryll. 89. 1837; Schenck in Flora Brazil. III, 178, Plate 21, fig. 21; Baker Amaryll. 133. 1888.

According to Herbert this species was originally observed along high hills near Minas Geraes, Brazil.

2. A. ISABELLINA Herb. Amaryll. 86, 396. t. 6, f. 4-6; Baker Amaryll. 134. 1888.

Herbert records that a very fine specimen of this species had been received by Sir W. Hooker from Mr. Tweedie who stated that it is one of the most beautiful flowers to be encountered in Rio Grande where it is found among the mountain marshes and rough pastures. The plant is reported as abundant near Portalegro, Brazil.

3. A. STENOPETALA Schenck in Martius Flora Brasiliensis. III. 1. 174; Baker Amaryll. 134. 1888.

4. A. RADULA P. Dusen, Species novae in "Serra do Itatiaya" Brasiliae indigenae II. Arch. Mus. Nac. Rio de Janeira 13: 103, 1903. Fedde Repertorium novarum specierum regni vegetalis 7: 264, 1909.

Description.—Stem glabrous. Leaves lanceolate, short petioled, glabrous below. Leaves of the involucre shorter than the pedicels. Pedicels 4—8, glabrous. One-flowered. Members of the perigone entire, not always unguiculate. Sepals narrow lanceolate, glabrous; petals narrow bristle-like, produced to a point. Stamens as long as the perigone; filaments glabrous. Style as long as the stamens.

Notes.—Native to Brazil: Serra do Itatiaya in primitive forests, at an elevation of 1300 meters above sea level. Another specimen was found

by E. Ule along the margin of a primitive forest at 1850 meters. Flowers from January to May. This species is related to *A. stenopetala* Schenck., from which it differs in the petiolate leaves; the lobes of the perigone and the glabrous filaments.

5. A. CUNEA Vell. Flor. Flum. III t. 121; Seub. in Martius Brasiliensis III. 172. *A schenckiana* Baker. Amaryll. 134. This species is closely related to *A. isabellina* Herb., and is native to Central Brazil.

6. A. GARDNERI Baker Journ. Bot. 1877, 261; Baker Amaryll. 134. 1888.

A native to Central Brazil, esp., the Province of Goyaz. Gardner nr. 4369.

7. A PLATYPHYLLA Baker in Journ. Bot. 1877, 261; Baker Amaryll. 134. 1888.

This species most likely was collected by Gardner at the same time as *A. gardneri* because its field number is nr. 4368.

8. A. LONGISTYLA Schenk in Martius Flora Brasiliensis III. I. 173; Baker Amaryll. 134-135. 1888.

9. A. APERTIFLORA Baker in Amaryll. 135. 1888.

10. A. MALMEANA Fr. Kraenzlin in Amaryllidaceae quaedum novae v. critica. Beibl. Bot. Jahrb. 50; nr. 112: 3, 1913.

Description.—Rhizome creeping, horizontal; roots turnip-shaped, narrowly tapering toward the top, ramose, 3—4 cm. long, 7—8 mm. thick. Stem thin, slender to about 90 cm. high. Underground internodia 7 to 8, very short; internodia above the ground long. Leaves linear to linear-lanceolate, obtuse 5—8 cm. long, 6 mm. wide. Bracts of the inflorescences 2 to 4, very small, obtuse, 2.5 mm. long. Inflorescence 3-flowered, 2.5 cm. long; pedicels 1 cm. long, glabrous. Perigone 1.8—2.2 cm. long. Sepals linear, fimbriate, spathulate, acute, at the end, 5.5 mm. wide. Petals of equal length, at the base linear, glabrous, further up obovate-spathulate, short acute, apiculate, 9—10 mm. wide. Stamens 2.2 cm. long, style much shorter; ovary cone-shaped, 2.5 mm. long. Flowers are light red and appear in February.

Notes.—Native to Brazil: Rio Grande do Sul, Santo Angelo pv. Cachoeira, in a moist field. Exped. I. Regnell Malme nr. 554.

According to Kranzlin this species is related to *A. apertiflora* Baker, a species which was also found among the plants of Regnell's Expedition nr. 1098 and nr. 2359. An important difference is found in the inflorescense which is here a "kurze dreistrahlige Dolde" (a short three-rayed umbel) which is five-rayed in the Baker species.

11. A. SELLOWIANA Seubert in Martius Flora Brasiliensis III. I. 173; Baker Amaryll. 135. 1888.

12. A. ZAMOIDES Baker Journ. Bot. 1877, 262; Baker Amaryll. 135. 1888.

13. A. BRASILIENSIS Spreng. Syst. II. 81; Baker Amaryll. 135. 1888.

Notes.—Herbert remarks "Brasiliensis (Sello) is much insufficiently described to be ever identified. It is supposed to be a variety of Monticola." According to Baker it is a native to Central Brazil, Provinces of Goyaz and Minas Geraes, gathered by Pohl and Sello.

14. A. CHAPADENSIS F. C. Hoehne, Monocotyledones, Amaryllidaceas. Annexo 5. Historia Natural. Parte V. Commisão de Linhas Telegraphicas Estrategicas de Matto-Grosso ao Amazonas. 18—19, Plate 81, 1915.

Description.—Rhizome more or less horizontal. Stem glabrous, subterete, more or less slender, slightly bending alternately in opposite directions, subventricose, partly slenderly tapering, erect, 15—20 cm. high. Leaves linear-oblong or oblong-subovate, blunt or rounded at the end, or acute, glabrous, submembranaceous, somewhat clasping around the stem, 6—7 cm. long, 1.5—2.2 cm. wide. Bracts of the involucre 4 to 6, linear-oblong, obtuse, subequal, 2.2—4 cm. long, 3—5 mm. wide. Inflorescence a terminal simple or slightly compound umbel, 5-flowered, glabrous, erect, angular. Perigone slanting erect, subhorizontal, funnel-shaped, 3.5—4 cm. long, at the top 2.2—2.5 cm, wide. Segments of the perigone obovate-subspathulate, unguiculate, above abruptly acuminate, subrounded; sepals yellow, apiculate; petals pubescent on the upper surface, yellow, suberect, margins recurved. Stamens much shorter than the perigone; filaments subsubulate, glabrous; anthers oblong, emarginate at the base. Ovary six-sided; style filiform, glabrous, remaining partly adhered to the fruit.

Notes.—From Brazil: "Cerrados" in Chapada Mts. at an elevation of 650 meters. Flowers appear in March. Herbarium nrs. 2964, 2965 and 4551.

Related to *A. brasiliensis* Spreng., from which it differs by the shape of the segments of the perigone and some other characteristics.

15. A. BURCHELLII Baker Journ. Bot. 1877, 262; Baker Amaryll. 135. 1888.

16. A CAMPANIFLORA Heinrich Freih. v. Handel-Mazzetti, Amaryllidaceae in R. von Wettstein and F. Schiffer, Ergebnisse der Botanischen Expedition der Kaiserl. Akad. der Wissensch. nach Sudbrasilien 1901. Denkschr. d. Kaiserl. Akad. d. Wissensch. Mathem. Klasses. 19: 213-214, Taf. XIX, fig. 2-6, 1908. J. R. Sealy, Curtis Bot. Mag. Plate 9664, 1944. *A. butantanensis* F. C. Hoehne. Uma Alstroemeria nóva dos arredores de São Paulo, Revista Museu Paulista 11: 483-488, 1 plate, 1919.

Description.—Rhizome 8—10 mm. thick with fleshy roots. Stem erect, 50—90 cm. high, glabrous. Sterile stems with shorter leaves than the fertile ones, shorter toward the base. Leaves 20 to 30, subsessile, resupinate, glabrous, narrow lanceolate to narrow oblong-lanceolate, glaucous, subcoriaceous, 6—15 cm. long, about 15 mm. wide, spreading

or ascending. Flower clusters a compound umbel, 10 to 20-flowered. Peduncles 10 to 25 mm. with the same number of bracts. Bracts and bracteoles 2—5 mm. long, much reduced; pedicels glaucous, 1.5—3.5 cm. long. Flowers tubular, 3.5—4 cm. long, yellow, greenish toward the base. Sepals glaucous, 3.5—4 cm. long, subequal, greenish inside; petals unequal, green furnished with dark brown blotches. Stamens 3.5 cm. long; anthers 8 mm. long. Ovary 5—6 mm. long. 7—2 mm. thick. Fruit a capsule, obovate, pyriform, 2.5 cm. long, 1.8 cm. thick. Seeds dark red, black toward the top, globose, 3—4 mm. thick.

Notes.—According to Handel-Mazzetti this species is closely related to *A. burchellii* Baker from which it differs by its longer leaves and its many flowered inflorescence, and larger flowers. His specimen was derived from São Paulo, Inter Rio Grande and Alto da Serra, at an elevation of 800 meters. Leg. M. Wacket, 1902, and Pion leg. Puiggari 1885. F. C. Hoehne who described this species under the name of *A. butantanensis* reports his plant from moist places near Butantan, São Paulo, where it flowers from November until December. The fruits mature from September to October. His herbarium numbers are nrs. 937, 1075 and 3068. Sealy relates that this rare species was introduced from Brazil through Major Pam in 1932. The plants flowered the following September. It grows in swamps and marshy places along the mountains between São Paulo and Santos. Sealy mentions that this species is related to *A. isabellina* Herb., both species having tubular flowers. Some authorities feel that it should be placed in the genus *Bomarea*.

17. A. CARYOPHYLLAEA Jacq. Schoenbr. VI. 33. t. 465; Herbert Amaryll. 89. 1837; Baker Amaryll. 136. 1888.

Notes.—This species is sometimes erroneously called *A. ligtu*, a mistake originally found in Curtis' Bot. Mag. plate 125, non Linn. It has no relationship to the *Ligtu* of Feuillée. Herbert mentions "In R. and Sch. the name *Curtisiana* is substituted; but I can see no reason for that, since the error had been long ago set right by Jacquin, who named it *caryophyllaea* on account of its fine fragrance, and there can be no doubt at all as to the identity of the plants." He mentions a variety under the name of *catharinensis* with very slender involucral bracts; petals spotted upward.

18. A. MONTICOLA Mart. in Schult. Syst. VII, 739; Herbert Amaryll. 89; Baker Amaryllid. 136. 1888.

19. A. HASSLERIANA J. G. Baker, Amaryllidaceae in R. Chodat et E. Hassler, Plantae Hasslerianae soit énumeration des plantes récoltées au Paraguay. Bull. de l'Herb. Boissier. 2 Ser. 3: 1101, 1903.

Description.—Stem 3—6 cm. high, moderately robust, striate, glabrous, erect, to the middle leafy, toward the base and top leafless. Leaves 10 to 12, sessile, lanceolate, 2—2.5 cm. long, 3—4 mm. wide, at the base attenuate, apex subobtuse, glabrous. Umbel 4 to 9 flowered; pedicels erect, glabrous, 1.5—2 cm. long; bracts lanceolate, leaflike, 1—1.5 cm. long. Perigone 1.3 to 1.4 cm. long; segments spathulate, 3 mm. wide,

white, dark tinted with greenish margins. Stamens as long as the perigone; anthers oblong; filaments filiform. Ovary turbinate, glabrous; lobes of the stigma short.

Notes.—Paraguay, from Tobaty nr. 6140. Plant. Hassl. I. p. 116. This species is apparently related to *A. monticola* Mart.

20. A. FOLIOSA Mart., in Schultes Syst. VII, 740; Herbert Amaryll. 91; Baker Amaryll. 136. 1888.

Notes.—G. Beauverd in Plantae Damazianae Brasiliensis, Bull. de l'Herb. Boiss. 2 Ser. 6: 587, 1906 mentions var. *floribunda* Beauv. Nr. 1553 from Alto do Itaculoni. Martius mentions in Flora Brasiliensis the following varieties: *augustifolius* Mart., with linear leaves and var. *humilior* Mart., with linear-lanceolate leaves. *A. foliosa* is a polymorphic species.

21. A. PIAUHYENSIS Gard. MSS.; Baker Amaryll. 136. 1888.

Notes.—A species related to *A. pulchella*. It has been recorded from shady woods near Veiras, Province Piauhy, Brazil. Gardner Nr. 2324.

22. A. PULCHELLA L. f. Suppl. 206; Herbert Amaryll. 101; Baker Amaryll. 136. 1888; *A. psittacina* Lehm. Cat. Hort. Hamb. 1826, ex Schult. f. Syst. VII, 739; Hook in Bot. Mag. t. 3033; Lindl. in Bot. Reg. t. 1540; *A. banksiana* M. Roem. Syn. Ensat.

Notes.—J. G. C. Lehmann describes this species under the name of *A. psittacina* in Plantas quasdem novas in Horto Hamburgensium Botanico cultas, Linnaea 5: 372-373, 1830. It is apparently recognized under this name as a separate species in Hortus Kewensis Suppl. VIII 1926-1930 (1933). Baker in Amaryllid. 136, recognizes the plant under the name of *A. pulchella* L. f. Herbert in Amaryll. 101, makes the remark that the type specimen has been much mutilated, especially as to the flowers. It was labeled in the hand-writing of Dryander and was supposed to be the plant indicated by Linnaeus f. in Suppl. 206. Linnaeus f. described his *pulchella* not from a specimen but from a drawing. It occurs to me that much has to be cleared up as to the nomenclature of this *Alstroemeria* species.

23. A. DAMAZIANA Gustav Beauverd, Plantae Damazianae Brasiliensis Bull. de l'Herb. Boiss. 2 Ser. 6: 587-588, 1 fig. 1906.

Description.—Stem glabrous, erect, 70—135 cm. high; leafless upward from 10 to 15 cm. Leaves narrow linear-lanceolate, resupinate, acute, becoming very narrow toward the petiole; base semi-amplexicaule, glabrous, 3—7 cm. long, 3—5 mm. wide. Bracts of the involucre 8 to 12, linear inequal, 1.5—5 cm. long, 1—4 mm. wide. Umbel 3 to 8 flowered. Perigone horizontal, subfunnel-shaped, 4 cm. long. Segments of the perigone unequal, pink spotted with purple stripes over the length. Stamens subulate, shorter than the perigone, 15—30 mm. long. Style filiform, glabrous, 2—4 mm. long; stigma 3-cleft, erect or recurved, 3—4 mm. long. Ovary oblong, costate.

Notes.—Brazil; from Capovira near Ouro Preto. Nr. 1521 collected

by L. Damazio, October 1904. This species reminds one of *A. pulchella* L. f. and still more of *A. piauhyensis* Gardn., as to its habit, its umbel and the irregular flowers. On account of the characteristic leaves on the fertile stem, as well as the morphology of the umbel, it approaches near to *A. piauhyensis* and also to *A. foliosa* Mart.

24.A REGNELLIANA F. Kraenzlin, Amaryllidaceae quaedam novae v. criticae. Beibl. Bot. Jarhb. 50 nr. 112: 2-3, 1913.

Description.—Stem stout glabrous; sterile stems densely foliated, 75 cm. long. Leaves turned upside down or resupinate, linear-lanceolate, acute to acuminate, glabrous 15 cm. long, 1.5 mm. wide. Fertile stems 120 cm. long, 1 cm. thick at the base. Inflorescense umbellate; bracts of the peduncles very small or wanting; peduncles usually 5—8 cm. long. Flowers horizontal, somewhat drooping, funnel-shaped, 3.5 cm. long. Sepals petal-like oblanceolate, acute, long-unguiculate at the base, more or less flesh colored, thereupon greenish. Petals with dark red spots. Stamens short. Capsule globose, obove applanate, 1.5 cm. thick. Flowers in November.

Notes.—Brasil; State of Minas Geraes, Las Caldas. Leg. Regnall nr. III 4796. Kraenzlin remarks that this species shows relationship to three or four others without mentioning the names. Conspicuous is the arrangement of the leaves; they are not distinctly in a spiral, they remind one more of a "reitend" appearance, as in *Iris* and *Gladiolus*. There is an absence of bracts near the individual flowering stems. The flowers as well as their color remind one of those of *A. psittacina* Lehm., under which we understand *A. pulchella* L. f., though other characteristics could not be compared with this species.

25. A. SCABERULA Baker Journ. Bot. 1877, 261; Baker Amaryll. 137. 1888.

26. A. LONGISTAMINEA Mart., in Schult. f. Syst. VII, 739. Herbert Amaryll. 90; Baker Amaryll. 137. 1888.

27. A. INODORA Herb. Amaryll. 90, tab. 2, fig. 1; Baker Amaryll. 137. 1888.

Notes.—According to Herbert, Mr. Tweedie wrote that on the first shooting this plant has much the appearance of *A. caryophyllaca*, but as it advances, becomes very different; that its tubers are less palmate, and its flowers are scentless. *A. nemorosa* Gardn., Bot. Mag. pl. 3958 is included as a variety.

28. A. INSIGNIS Fr. Kraenzlin, Amaryllidaceae quaedam novae v. criticae. Beibl. Bot. Jahrb. 50 nr. 112: 3—4, 1913.

Description.—Rhizomes or root-tubers unknown. Fertile stem about 90 cm. high; leafless for three quarters from the base. Leaves close together, long petiolate. Petioles twisted, 2—4 cm long; blades oblong-lanceolate, acute, thin, 2.5—12 cm. long, 1.5—3.5 cm. wide. Bracts about 5, oblong, obtuse; pedicels 4.5 cm. long. Umbel about 6-flowered. Sepals

petal-like, linear toward the base, further dilate, spathulate to abovate; 1.2 cm. wide; petals more expanded, above rotundate, apiculate, about 4 cm. long, 1.6 cm. wide. Stamens 3 cm. long. Ovary inversely conical, 6—7 mm. long. Color of the flowers unknown.

Notes.—Brasil; São Paulo, Alto de Serra, between shrubs. Drusen nr. 14218. According to Kraenzlin it is difficult to decide whether this species is related to *A. caryophyllaea* Herb. (Jacq.?), *A. inodora* Herb., or similar species.

29. A. PYGMAEA Herb. Amaryll. 100, 397. tab. 8, fig. 4-13; Baker Amaryll. 137. 1888.

30. A. REVOLUTA Ruiz et Pav. Flor. Peruv. III, 59; Herbert Amaryll. 91; Baker Amaryll. 137. 1888.

31. A. VERSICOLOR Ruiz et Pav. Flor. Pav. III, 59; Baker Amaryll. 138. 1888.

Notes.—Baker recognized var. *recumbens* (Herb.), in Baker Amaryll. 97 and var. *Cumingiana* (Herb.), in Baker Amaryll 11. 96. They were described by Herbert as separate species. Baker mentions that from the material at hand, he cannot separate specifically *A. tenuifolia* Herb., *A. nivalis* Meyen, *A. Kingii* Phil., *A. xanthina* Phil., *A. puberula* Phil., *A. tigrina* Phil., and *A. citrina* Phil. Also in the Index Kewensis these are referred to *A. versicolor*.

32. A FIEBRIGIANA F. Kraenzlin, Amaryllidaceae andinae in Ign. Urban, Plantae novae andinae imprimis Weberbauerianae III. Bot. Jahrb. 40: 237, 1908.

Description.—Roots fibrous, fleshy. Rhizome more or less prostrate. Stem 20—30 cm. long. Leaves lanceolate, acuminate, glabrous, 6 cm. long, 6—8 mm. wide. Inflorescence 2-flowered; bracts leaf-like as long as the pedicels. Pedicels usually four, 3—4 cm. long. Bracteoles short. Flowers yellow, striped with pink, 3 cm. wide; sepals unguiculate, lanceolate, acute apex recurved, 2.3—2.5 cm. long, 6—7 mm. wide; petals obovate, obtuse, minutely apiculate, 2—2.2 cm. long, 1 cm. wide. Stamens as long as $^3/_4$ of the perigone, equal; filaments pilose. Style a third or a quarter shorter. Ovary glabrous.

Notes.—Southern Bolivia; Escayache near Tariija; along rocky slopes at an elevation of 3700 meter above sea-level. Fiebrig nr. 3013. This species resembles *A. recumbens* Herb. [*A. versicolor* Ruiz et Pav., var. *recumbens* (Herb.) Baker.]. Its habit is however, shorter and more compact, bearing a large number of lanceolate leaves. The rhizome is almost leafless. The inflorescense is always 2-flowered.

33. A INCONSPICUA Phil. Anales Univ. Chili. 1873, 546; Baker Amaryll. 138. 1888.

34. A. NIVALIS Phil. Linnaea 29: 58, 69, 1857, non Meyen. Baker Amaryll. 138. 1888.

35. A. PAUPERCULA Phil. Flor. Atac. 51, nr. 371; Baker Amaryll. 138. 1888.

Notes.—This species is related to *A. violacea* Phil. It was first found in Atacama, Mejillones at 400 meter elevation, on a desert coast mountain.

36. A. ROSEA Phil. Sert. Mendoc. Alt. 43, non Hook.; Baker Amaryll. 138. 1888.

37. A. ARAUCANA Phil. Anales Univ. Chil. 547, 1873; Baker Amaryll. 139. 1888.

38. A. VOLCKMANNII Baker Amaryll. 139. 1888; *A. stenopetala* Phil. Anales Univ. Chil. 71, 1871, non Schenck.

39. A. VIOLOCEA Phil. Flor. Atac. 51. nr. 370; Baker Amaryll. 139. 1888.

Notes.—Philippi states that this species is very variable, like many other species of this genus. It is therefore difficult to classify a specimen from the description. Plants occur with one flower; other inflorescences have three, five and more flowers.

40. A. LIGTU L. Spec. Plant. ed. 2. 462; Feuillée Obs. II. 710. t. 4; Herbert Amaryll. 92; Lindl. Bot. Reg. 1839. t. 3; Baker Amaryll. 139. 1888, non Curt. Bot. Mag. t. 125.

Notes.—This species was described and illustrated by Feuillée in 1714, being the first illustration of an *Alstroemeria*. He found the plant growing near Conception, Chile. Baker mentions the var. *pulchra* Sims in Bot. Mag. t. 2421. (*A. bicolor* Hook. Exot. Flora t. 65; Lodd. Bot. Cab. t. 1147, *A. Flos-Martini* Ker. Bot. Reg. t. 731; Sweet Brit. Flow. Gard. ser. 2. t. 277, *A. tricolor* Lodd. Bot. Cab. t. 1497.) Its leaves are narrower than those of the species.

41. A. PARVULA Phil. Linnaea 261, 1864-65; Baker Amaryll. 139. 1888.

42. A. NUBIGENA Phil. Linnaea 67, 1857-58; Baker Amaryll. 140. 1888.

43. A. PHILIPPII Baker. Amaryll. 140; *A. violacea* Phil. Deser. Nuev. Pl. 72, 1873; non Flor. Atac. nr. 370.

44. A. PELEGRINA L. Spec. Plant. ed. 2. 461; Feuillée Obs. II. t. 5; Bot. Mag. t. 139; Jacq. Hort. Vind. I. t. 50; III. t. 73; Lil. t. 46; Lodd. Bot. Cab. t. 1205; Baker Amaryll. 140. 1888.

Notes.—The plant was introduced in 1753. It is called *P. peregrina* by Herbert. He mentions three varieties e. g. *albescens, squammata* and *flore pleno*. Of the last he states that it is a beautiful white with green variety.

45. A. GAYANA Phil. Linnaea 71, 1857-58; Baker Amaryll. 11, 140. 1888.

Notes.—This species is considered by some as intermediate between *A. pelegrina* and *A. haemantha*.

46. A. HAEMANTHA Ruiz et Pav. Flor. Peruv. III, 60; Herbert Amaryll. 99; Sweet. Brit. Flow. Gard. ser. II. t. 158; Regel, Gartenflora t. 264; Baker Amaryll. 140-141. 1888; *A. pulchella* Sims in Bot. Mag. t. 2354; Hook. Exot. Flora t. 64; Lindl. in Bot. Reg. t. 1008; *A. simsii* Spreng.; Sweet in Brit. Flow. Gard. t. 267.

Notes.—Herbert states that this is a variable species. He recognizes the following varieties *simsiana, albida* and *pilosa.*

47. A. AURANTIACA D. Don. in Sweet Brit. Flow. Gard. ser. 2. t. 205; Lindl. in Bot. Reg. t. 1843; Baker Amaryll. 141. 1888; *A. aurea* Meyen; Hook in Bot. Mag. t. 3350.

Notes.—Herbert in his Amaryllidaceae, p. 98, described this species under the name of *A. aurea.* He states that it was collected on the Island of Chiloe and was grown from seed by Mr. Lowe, nurseryman at Clapham. At that time it was considered a very beautiful plant, being very hardy.

48. A. BAKERI Ferd. Pax, Beitrage zur Kenntnis der Amaryll. idaceae, Bot. Jahrb. 11: 335, 1890.

Description.—Stem erect, slender, 30—40 cm. high, 3—4 mm. thick. Leaves linear, acute not resupinnate, sessile, glabrous, 2—4 cm. long, 5—6 mm. wide. Inflorescence pseudo-umbellate, 2-flowered, elongate. Bracts leaf-like, 1—1.5 cm. long, 2—5 mm. wide. Pedicels 3—4 cm. long. Flowers entire; sepals 1.5 cm. long, 5—6 mm. wide; petals 2 cm. long; 6 mm. wide, subequal, oblong-lanceolate, acute, unguiculate. Stamens very much declinate, shorter than the perigone; filaments filiform 1.5 cm. long; anthers globose. Style declinate, filiform, shorter than the stamens. 1 cm. long; stigma 3-cleft; ovary turbinate, 5 mm. long.

Notes.—Argentine; Catamarca. Leg. Schickendantz XII, 79. This species shows affinity to *A. aurantiaca* D. Don, from which it distinguishes itself through its small, sessile, linear leaves which are not resupinate; the loose flower cluster and the smaller flowers.

49. A. VENUSTULA Phil. Linnaea 260, 1864-65; Baker Amaryll. 141. 1888.

50. A. LINEATIFLORA Ruiz et Pav. Flor. Peruv. III, 60. t. 289; Herbert Amaryll. 92; Baker Amaryll. 141. 1888.

51. A. PAVONIANA G. Beauverd, Phanerogamarum Novitates, Bull. Soc. Bot. Geneva. 2 ser. 14: 176-177, 1 fig. 1922.

Description.—Fertile stem 10 mm. thick, glabrous, very leafy. Leaves linear-lanceolate, 1.5 cm. long, 15 mm. wide, revolute, base semi-amplexicaule, apex acute. Umbel nodding, 12 to 15 flowered; pedicels short. Perigone 6.5 cm. long; sepals linear, spathulate, 6 cm. long, 8 mm. wide; apex obtuse; petals spathullate-lanceolate, 6.5 cm. long, 10 mm. wide; apex subacute. Stamens 6 cm. long; anthers introrse; Ovary

conical, attenuate; style 30—35 mm. long; stigma filiform, 8 mm. long. Capsule unknown.

Notes.—Peruvian Andes. Leg. Pavon. Type in Herbarium Boissier. The description of this species is based upon incomplete material. Yet this species is entirely different from those that have been described from the Andes. It may have some affinity to *A. lineatiflora* Ruiz et Pav. It is distinguished by an inflorescence with much shorter rays and which are much more numerous. The specimen of Pavon was found among the material of *Bomarea*. It resembles somewhat *B. glaucescens* (H.B.K.) Baker, but as a result of the examination of the perigone, there is no doubt but that this is a typical andine *Alstroemeria*.

52. A. CHORILLENSIS Herb. Bot. Reg. 1843; Misc. nr. 95; Baker Amaryll. 141. 1888; *A. lineatiflora* Lindl. Lindl. in Bot. Reg. 1843, t. 58, non Ruiz et Pav.

Notes.—The type specimen of this species was a cultivated plant. It was originally sent from Lima by Maclean.

53. A. CROCEA Phil. Linnaea 264, 1864-65; Baker Amaryll. 142. 1888.

This species is related to *A. spathulata* Presl.

54. A. SPATHULATA Presl. Rel. Haenk. II, 122. t. 22, fig. 2; Herbert Amaryll. 94; Baker Amaryll. 142. 1888.

Notes.—*A. sericantha* Schuer (*A. umbellata* Meyer) is likely a dwarf variety of *A. spathulata*. The one described as *A. neillii* Hook. in Bot. Mag. t. 31-5 may be a robust cultivated specimen. There is possibility that *A. andina* Phil., in Linnaea 29, 1857-58, with smaller flowers belongs here.

55. A. CRISPATA Phil. Linnaea 70, 1857-58; Baker Amaryll. 142. Baker describes it as a "very distinct and curious little species."

56. A. SOTOANA R. A. Philippi, Plantas nuevas chilensis, Anales Univ. Chile 93-159, 1896.

Description.—Rhizome and root-tubers unknown. Of five specimens examined the tallest was 47 cm. with nine flowers; the shortest being 10.9 cm. high with only two flowers. Leaves resupinate, more or less close to each other; smaller ones reduced to scales; the largest 25 mm. long and 3.5 mm. wide, linear, acute, crassicaule. Umbel bifid, 2 to 9-flowered, carrying at its base of the peduncles bracts of equal size, 20 mm long. Flowers yellowish, purple spotted. Segments of the perigone 32 mm. long, 11 mm. wide, narrow, rounded at the top, mucronate. Stamens and the style bent downward, then raised along the length of the perigone.

Notes.—No relationship to other species is indicated. Chile; Andine Valey "de los Cipreses."

57. A. PATAGONICA R. A. Philipi, Plantas nuevas chilensis, Anales Univ. Chile. 93: 160, 1896.

Description.—Rhizomes and root-tubers unknown. Stems low, about 8.5 cm. high. Leaves close together, linear, turned upward or resupinate,

narrow toward the base, 22 mm. long, 2 mm. wide; the lowest scale-like. Stalk one-flowered. Segments of the perigone of the same length; sepals 20 mm. long, 8 mm. wide, spathulate, mucronate; yellow inside, pink outside, all the way to the middle purple spotted; 20 mm. long, 5 mm. wide. Style shorter than the perigone, about 16 mm. long; stigma 2 mm., revolute, elongate, broad.

Notes.—Chile; from Santa Cruz. Collector Henricus Ibas, 1877. No relationship to other species has been indicated.

58. A. NANA A. B. Rendle, in Mr. Hesketh Prichards Patagonian Plants, Journ. Bot. 42: 325-326, 1904.

Description.—Low glabrous herb. Fertile stems 8—12 cm. high, 2 mm. thick, colorless below, tinged with red, occasionally greenish above. Sterile stems reaching about half the length and thickness of the fertile stems; its leaves 2.5 cm. long, 1.5—2 mm. wide. Leaves of the fertile stem scale-like, 6—8 mm. long to slender linear, 1.5—2 cm. long. Flowers, single, erect, terminate. Perigone 2 cm. long; sepals 7 mm. wide, spathulate, cuspidate, yellowish; petals slightly narrow and longer, reddish spotted. Filaments slender, complanate, more or less recurvate, shorter than the perigone; anthers short, sub-uniform, 1 mm. wide. Style shorter than the perigone; stigma linear.

Notes.—Patagonia; a flowering specimen was collected on the slopes of Mt. Frias and shingle beach of Lake Argentina, and a leafy specimen on the top of Mt. Frias.

This species is apparently related to *A. patagonica* Phil. Baker states that the plants are about the same size as those of the andine species *A. pygmaea* Herb., which is also a one-flowered species. The specimens described by Rendle were part of the plants collected in Patagonia by Mr. Hesketh Prichards. They were presented by him to the National Herbarium. They came from "the western end of Lake Argentine, where the lake is broken into many fiords by the forest-clad foot-hills of the Andes." Lake Argentine is situated at about 650 feet above sea-level.

59. A. POLYPHYLLA R. A. Philippi, Plantas nuevas chilensis, Anales Univ. Chile. 93: 160. 1898.

Description.—Rhizomes and root-tubers unknown. Plants low, stem about 12 cm. high, densely covered with leaves. Leaves resupinate, oblong, acute, narrow toward the base, 35 mm. long, 14 mm. wide. Inflorescence umbellate, number of flowers variable; bracts short linear-lanceolate, 12 mm. long. Perigone 17 mm. long, yellow to light yellow, unequal, narrow lanceolate; petals purple spotted above. Stamens as long as the perigone; style slightly longer.

Notes.—Chile; in the desert of Atacama, Quebrada de Sorna, collected by Franciscus San Roman. No relationship to other species has been indicated.

60. A. MODESTA R. A. Philippi, Plantas nuevas chilensis, Anales Univ. Chile. 93: 161. 1896.

Description.—Rhizome and root-tubers unknown. Stem as far as its bifurcation 14 cm. long, 4 mm. thick. Scale-like leaves 8 mm. long, 4 mm. wide, those toward the base of the flowers 14 mm. long. Umbel 2-flowered, with two bracts. Peduncles about 4 mm. long; bracts 10 mm. long. Flowers white to whitish; sepals toward the top more or less violet, obovate, tridentate, 26 mm. long, 12 mm. wide; petals to 30 mm. long, 11 mm. wide, yellowish with purple spots.

Notes.—Chile; reported from Copiapo. No relation to other species has been indicated.

A. GRAMINEA R. A. Philippi, Plantas nuevas chilensis, Anales Univ. Chile. 93: 161-162. 1896.

Description.—Rhizomes and root-tubers unknown. Stem about 7 cm. long, glabrous, covered densely with leaves. Leaves narrow linear, 3.8 to 6 cm. long, 3 mm. wide, straight, sharp pointed. Stem one-flowered. Flowers sub-sessile, small. Segments of the perigone obovate or obcordate, pale red, ending in a short pointed tip, lemon color spotted, 17 mm. long, 5 mm. wide, oblong, becoming very narrow; Stamens much shorter than the perigone.

Notes.—Chile; from Breas in the desert of Atacama. Collected by Alamirano Larrañaga. No relationship to other *Alstroemerias* is indicated.

62. A. AMAZONICA A. Ducke, Plantes nouvelles ou peu connues de la region amazonienne, Archiv. Jardin do Rio de Janeiro, 1: 12, plate 3. 1915.

Description.—Rhizome and root-tubers unknown. Fertile stem 40 cm. high. Leaves usually strongly reduced, sessile, glabrous, spathulate: the upper ones lanceolate, 1—1.5 cm. long, 4 mm. wide. Sterile stems often flexuous; its leaves petiolate, ovate-lanceolate, pointed at the apex. Bracts of the involucre four, ovate-lanceolate, 2.5 cm. long, 6 mm. wide. Umbel simple, 2—6.5 cm. long, erect to spreading, angulose. Perigone nodding, tubulate-campanulate, 4.5 cm. long, 2.5 cm. wide; sepals subequal, 8 mm. wide; petals 6 mm. wide, ovate-lanceolate, base anguiculate, apex acute, red, partly greenish-yellow. Stamens shorter than the perigone; filamens subulate; style as long as the stamens.

Notes.—Brazil; the first *Alstroemeria* that was found in Amazonia, in the northwestern part of the state of Pará. The very reduced leaves that are found along the flowering stem are very characteristic of this species. No relationship to other species has been indicated.

ACKNOWLEDGMENTS.—The writer wishes to acknowledge the kindness and help extended, during the preparation of the manuscript, by Dr. F. C. Hoehne, Director of the Institute de Botanica, São Paulo, Brazil; Mr. Ralph W. Wheeler of Winter Park, Florida; Prof. Erdman West of the Florida Agricultural Experiment Station, Gainesville, Florida; the Library Staff of the U. S. Department of Agriculture, Washington, D. C., and the New York Botanical Garden.

Plate 5

Amaryllis maraeasa Traub, *sp. nov.*

AMARYLLIS MARACASA, SP. NOV.

HAMILTON P. TRAUB, *Maryland*

On one of his plant exploration trips, Mr. Mulford B. Foster, of Orlando, Florida, collected an odd and interesting species which was new to science and which has been named *Amaryllis maracasa*. It appears to be closely related to *Amaryllis organensis*, differing markedly in having greater diversity in tepalseg sizes and shapes, and in having a flower which does not open widely (Plate 5). It is an interesting addition to the collection of species, and will be treasured on that account. However, for the experienced breeder, it could add something worth while to the synthesis of hybrid *Amaryllis* since it flowers 2 to 3 times from the same bulb over about a two months' period.

Amaryllis maracasa Traub, **sp. nov.**

Herba bulbosa; foliis usque ad 7 lanceolatis acutis, ad basin 2.2 cm. latis, medio 3.9 cm. latis; pedunculo 64—71 cm. alto; umbella biflora; spatha bivalvata, valvis 5.5—6.5 cm. longis; pedicellis 5.5—8 cm. longis; perigonio 14 cm. longo non patulo lateritio-rubro, gula asteri viridi ornata; segmentis tepalorum aliquanto irregularibus, magnitudine in ordinibus 4; tubo tepalorum 2 × 1 cm.; paraperigonio 1—2 mm. longo, setis albidis; staminibus segmentis maximis tepalorum brevioribus exsertis; stigmate trifido, lobis globulosis.

Bulb medium sized; leaves up to 7, glaucous, with whitish bloom, up to 52 cm. long, concave on upper side, edges recurved downward, lanceolate, acute, 2.2 cm. wide at the base, 3.9 cm. wide above the middle, narrowing to an acute apex; peduncle reddish toward the base, dull green otherwise, with a distinct whitish bloom, up to 64 cm. tall at anthesis, elongating up to 71 cm. after anthesis, up to 1.5 x 2 cm. at the base, nearly round at the middle, up to 1.8 x 1.8 cm. in diam. and 1 x 1.1 cm. at the apex; umbel 2-flowered; spathe 2-valved, valves 5.5—6.5 cm. long, lanceolate, acute; pedicels 5.5 cm. long at anthesis, elongating 7—8 cm. after anthesis; perigone 14 cm. long, not wide open, 11 cm. across face, brick red (RHS o16/1), reticulated deeper red, green star in throat; ovary 1.6 cm. long, 9—10 mm. wide, triangular-rounded, slightly curved; tepaltube about 2 cm. long, 1 cm. wide; a small paraperigone of whitish bristles above the stamens; tepalsegs of four different sizes: top setepalseg much widened (6 cm.) at the middle, 12 cm. long, apex acute; the two bottom setepalsegs similar but narrower at the middle, conniving-sickle-shaped, 11 cm. long, up to 4.8 cm. wide, apex acute; the upper two petepalsegs lanceolate, acute, 11 cm. long, 3.2 cm. wide, apex acute to acute-rounded; the bottom petepalseg lanceolate, acute, 9.8 cm. long, 2.2 cm. wide at the middle; stamens and style entirely close in the throat of tepaltube; stamens of four different lengths, shorter than the longer

tepalsegs, style reddish, exserted, about as long as the top setepalseg; stigma white, trifid, lobes globulose. Type: Traub nos. 198, 199, 200 and 201, in the Traub Herbarium; type illustration, Plate 5.

RANGE.—Brasil; at Monte de Burro, municipio Maracas, State of Bahia, alt. 3,500 ft.

NOTES.—Flowered under cultivation in June and July, 1951.

FURTHER REMARKS ON AUSTRALIAN AMARYLLIDS

C. M. EARDLEY, *The Herbarium, University of Adelaide*

Taking as a basis the recent article of Mr. J. H. Willis (PLANT LIFE, Vol. 5 No. 4, Oct. 1949, pp. 51-53.) on Australian Amaryllids, we have the following state of affairs. Most of the published Australian floras in common use are not of very recent date, except odd regional ones; and amaryllidaceous plants are not particularly numerous in the Australian native flora (there is, however, a rather notable group of endemic genera in south-western Australia); therefore most taxonomists concerned with the Australian flora think of the family in its widest sense as did the older authors like Bentham and even Pax and Hoffman in their monograph in the second edition of Engler and Prantl's NATUERLICHE PFLANZENFAMILIEN, 1930. There has been no influential expression of critical opinion by Australian botanists on the subject of Hutchinson's revised classification of 1934, in so far as it affects the Australian genera.

However, this matter of the limits of the family has of necessity been carefully considered for the policy of the journal HERBERTIA, consequently the only Australian genera one can legitimately discuss here are the three—*Crinum*, *Eurycles* and *Calostemma*, all bulbous plants with basal leaves and umbellate inflorescences.

Nevertheless, it is not out of place to mention that amaryllid enthusiasts are missing some most interesting and peculiar forms when they cast out of the fold of *Amaryllidaceae* proper that group of genera endemic to south-western Australia included in the tribe *Conostyleae:* Mr. Willis names these five genera in his previously mentioned article under Nos. 8, 9, 10, 11 and 12. Some of them, like the Kangaroo Paws (*Anigozanthos*), are known as horticultural rarities in Europe and America; others are not cultivated as yet; in this tribe the floral perianth is of stout woolly texture rather like a piece of rough velvet fabric, with the rough outside and the smooth inside; the flowers therefore look unreal, particularly in the species with unusual colour combinations such as hard red with green, black with yellow, or bright green alone; some of the yellow and orange forms are more delicate in colour.

There is also that other successfully cultivated Australian endemic

genus, *Doryanthes*, which has the *Agave* growth habit and produces a huge and ornamental spikelike inflorescence of red flowers. However, neither *Doryanthes* nor the *Conostyleae*, tempting and fascinating though they be, are for the followers of the pure cult of the amaryllid. Nor has Australia any *Agapantheae*, *Gilliesieae* or *Allieae*, as accepted by Hutchinson for the family.

Let us then turn our attention to what is acceptable from the Australian native flora.

First of all there is *Calostemma* (restricted to Australia) with four species found in the eastern mainland states, they are —

C. purpureum R. Br. Flowers red or pink; the southern-most species.
C. luteum Sims. Flowers yellow; in cultivation.
C. Scott-Sellickianum F. M. Bailey.
C. album R. Br. Flowers white. (Has affinities to *Eurycles*)

The first, *C. purpureum* has a southern distribution, and the other three species occur in warmer regions, especially Queensland. The flowers are smaller than those of most species of *Crinum* and *Eurycles* but are produced in umbels like them, and they have a small corona. There is one fleshy seed per flower which germinates in a curious way and somewhat resembles the seeds of certain *Crinums*, *Eurycles* and *Coburgia*. The cultivation in California of *C. purpureum* was recorded in Herbertia *9:* 1942 p. 99. On account of the small flowers *Calostemma* would probably be best grown in rows or masses.

Illustrations.—Bot. Mag. t. 2100, t, 2101, Botanical Register 421, 422: 1840 t. 26; 1840 t. 19; F. M. Bailey—"Comprehensive Catalogue of Queensland Plants," Brisbane. 1909, and Bailey—"Queensland Flora" V. Brisbane, 1902.

The next genus *Eurycles* has two species —

E. Cunninghamii Ait. is endemic.
E. sylvestris Salisb. is shared with the Malayan Archipelago and is known by various synonyms, among them *Pancratium amboinense* L. They occur in Queensland and New South Wales and are both white flowered. There is a corona and the flowers are of medium size; they are probably rare in horticulture.

Illustrations.—Bot. Mag. t. 3399, t. 1419; Botanical Register 715; 1506.

Our final genus *Crinum* needs no introduction to horticulturists; there are now approximately 130 species recognized with over 30 in culture. The horticultural possibilities of any *Crinum* are worth investigating, therefore the 12 Australian species will be listed. Northern Australia, particularly Queensland, has the majority of these species. the one that extends farthest into the temperate part of Australia is *C. flaccidum* which occurs as far south as Victoria and South Australia; it is popularly called the "Murray Lily" because it is found along the River Murray as well as in other dry inland regions.

In giving this list it should be stated that no attempt has been

made to include varieties or to quote the many synonyms; the names listed are all to be found in the REVIEW OF THE SPECIES OF *Crinum* by J. C. Th. Uphof (HERBERTIA *9*: 63-84, 1942) where references to descriptions are given, and if these are not readily available, they are quoted by Uphof; thus he gives the descriptions of the five species named by the Queensland botanist, F. M. Bailey (possibly all endemic). All of Bailey's species except his later *C. intermedium*, are described and illustrated in his QUEENSLAND FLORA Vol. V, Brisbane, 1902, where collecting localities are also given; this work gives descriptions of the other Australian species also, except *C. asiaticum* which is not confined to Australia.

The seeds of *Crinum* are often fleshy and large like a small potato. Various hybrids have been produced; flower colour in the genus is white or reddish. Some references to illustrations are given here, more will be found in G. Bentham's FLORA AUSTRALIENSIS Vol. VI and in Uphof's "Review"; the numbers in front of the species below refer to the list in the last mentioned work. It will be interesting to find from readers of HERBERTIA how many of these species have been tried in cultivation.

Crinum species native to Australia

[See F. M. Bailey's QUEENSLAND FLORA V, Brisbane, 1902]

76. *C. flaccidum* Herbert, Murray Lily. Probably endemic. Ill. Bot. Mag. Pl. 2133; Bot. Register 426.

1. *C. asiaticum L.* Not described in "Queensland Flora," but well known from tropical Asia. Ill. Bot. Mag. Pl. 1073.

47. *C. venosum* R. Br. Ill. "Comprehensive Cat. Quld. Pl." Probably endemic.

48. *C. uniflorum* F. v. M. Ill. "Comprehensive Cat. Quld. Pl." Probably endemic.

4. *C. brachyandrum* Herbert. Probably endemic. Ill. Bot. Mag. 2121.

49. *C. angustifolium* R. Br. (2 vars.) Probably endemic. Ill. Bot. Mag. 2522.

13. *C. pedunculatum* R. Br. According to Bailey has several perennial stems up to 2 feet high, bearing leaves and flower stalks; in other species these latter arise from the bulb. Probably endemic. Ill. "Quld. Flora"; Bot. Reg. Pl. 52; Bot. Mag. Pl. 2121 (as *C. canaliculatum* Roxb.)

45. *C. intermedium* Bail. Described in Queensland Agric. Journ. N. S. 1: 124, 1919. From Wai Weir Island.

3. *C. Douglasii* Bail. Ill. "Quld. Flora." Thursday Island.

46. *C. brevistylum* Bail. Ill. "Quld. Flora." Turtle Island.

51. *C. pestilentis* Bail. Ill. "Quld. Flora." Bulloo River. Odour so strong as to cause some people to vomit.

50. *C. brisbanicum* Bail. Ill. "Quld. Flora." Near Brisbane.

NARCISSUS POETICUS IN THE AUSTRIAN ALPS

The illustration, Figure 6, showing a field of blooming *Narcissus poeticus* in the Austrian Alps was furnished by Eugen Hahn, Alleestrasse 4, Kirchheimbolanden, Pfalz., Germany.

Fig. 6. Field of *Narcissus poeticus* in the Austrian Alps. Photo by Eugen Hahn.

ON THE SYSTEMATIC POSITION OF **LAPIEDRA MARTINEZII** LAG.

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INTRODUCTION

In discussing the problem of the systematic position of the genus *Lapiedra* Lag., Traub and Moldenke (1947) write: "The systematic position of *Lapiedra* now appears to be secure among the *Galantheae*, but it must be realized that all the needed evidence has not yet been assembled. It is particularly important to determine the chromosome complement before considering the case closed." At the same time, these authors have had the kindness to encourage us to make this study.

Having succeeded in obtaining some bulbs of *Lapiedra Martinezii* Lag., we have undertaken to study the cytology of this species with the aim of filling in the lacuna pointed out by Traub and Moldenke (1947). We are reporting here the results of our researches, which have been limited to a study of the chromosomes in the cells of the root tip meristems and in the pollen grains, since, unfortunately, because of lack of material, we have not succeeded in studying meiosis.

MATERIAL AND TECHNIQUE

Lapiedra Martinezii Lag. is a difficult plant to obtain, since it is found only in the east and south of Spain and in the north of Spanish Morocco. However, thanks to the kindness of Professor Munoz Medina, Catedratico de l'Universite de Granada, and of M. P. Palau Ferrer, (we express here our strongest thanks to them for the aid granted us), we obtained some bulbs; these have been grown in pots at the Botanic Garden in Coimbra. These bulbs have furnished many root tips which have been fixed in Navashin's fluid and La Cour 2BD. After paraffin infiltration, the root tips have been cut in transverse sections at 20μ thickness, and afterward stained in gentian violet.

During the summer of 1949, we tried to obtain reduction divisions in the pollen mother cells. Unfortunately, all of the attempts made for this purpose have failed and we were only successful in finding flowers with anthers that already had pollen grains. These anthers, sampled from two different plants, were fixed in alcohol-acetic (3 parts absolute alcohol: 1 part crystalizable acetic acid). Afterwards, non-permanent preparations have been made from these anthers, by means of dissociating them in either a drop of aceto-carmine, or acetic-orcein.

OBSERVATIONS

In metaphase plates of the root tip cells, we have counted 22 chromosomes, corresponding to 11 pairs with the following morphological characters (fig. 7):

A—Isobrachial pair LL, where no secondary constriction has been observed;

B—Pair Ll, each arm shows a secondary constriction, localized a short distance from the centromere;

C—Pair Ll, having no secondary constrictions and with the arm l less long than that of the preceding pair;

D—Pair Lp′, having the arms longer than all other pairs of Lp;

E—Pair Lp′, similar to the above pair but with the arm p shorter;

F—Pair Lp, rather similar to pair E, but minus the satellite, and the arm p less long;

G—Pair ll, very close to isobrachial;

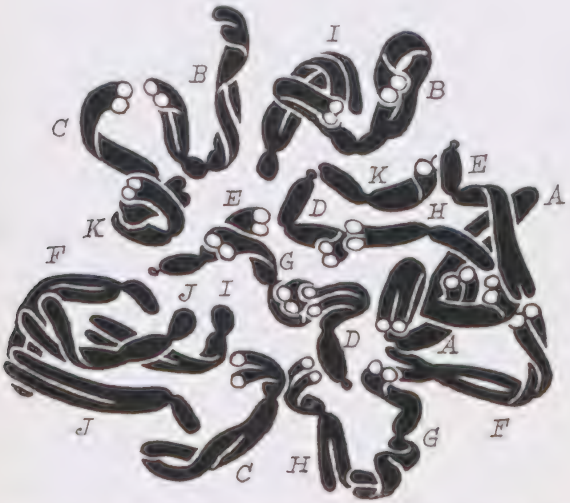

Fig. 7. *Lapiedra martinezii* Lag. Equatorial plate of a root tip cell showing 22 chromosomes. The 11 pairs are indicated by the letters A-K x 3450.

H—Pair lm;

I—Pair lp;

J—Pair lp, rather like the pair I, but the arm p less long and the arm l a little shorter.

K—heterobrachial mp;

Because of their small size, it is very difficult to obtain evidence of all four satellites in the same figure. However, we have succeeded in some cases (fig. 7). According to the number and position of the satel-

lites, we have verified the appearance at the first stage of telophase, of four nucleoli occupying a proximal position.

Among the root tips examined we have found one that shows mixoploidy, with some cells diploid and other tetraploid, having 44 chromosomes (fig. 8). The latter cells have been found in the periblem, where they form longitudinal rows among the normal cells. Very probably, tetraploid cells have been produced by means of a mechanism that we have described for *Narcissus reflexus* Brot. (v. Fernandes, 1936); that is to say by the fusion of two nuclei after mitosis, that has not been followed by cytokinesis or followed by the formation of an incomplete wall.

Fig. 8. *Lapiedra martinezii Lag.* Tetraploid equatorial plate (44 chromosomes) in the periblem of a mixoploid root. x 3450.

In the equatorial plates of the first division of the nucleus of the pollen grains (fig. 9), we have counted 11 chromosomes that show besides a high degree of correspondence to the characters of the pairs that have been described in connection with the root tips. Thus, the idiogram of *Lapiedra Martinezii* Lag. can be represented by the following formula (fig. 10*a* and *b*).

GEOGRAPHIC DISTRIBUTION

Lapiedra Martinezii Lag., only grows in the fissures of calcareous rocks (Willkomm and Lange, 1861-1880) in the mountains of eastern and southern Spain, and in the north of Spanish Morocco, as they show

in their list of localities,[1] as well as the map of fig. 11, constructed according to the data of a list given below:

Valencia: Sagunto; Mt. Murviedro.

Murcia: Santuario de Fuensanta near Algezares; neighborhood of Múrcia.

Granada: neighborhood of Códbar; Cabo de Gata; Almeria; Sierra de Elvira; Adra; Málaga; Churriana; Carratraca; Alpujarras; Lanjaron.

Cordoba: Rute.

Spanish Morocco: Villa Sanjuro, Melilla; Hassi-Berkan; etc. (Font-Quer).

Fig. 9. *Lapiedra martinezii* Lag. Metaphase plate of the first mitosis of a pollen grain. The 11 chromosomes are indicated by the letters A-K. x 1800.

DISCUSSION

According to Boissier (1839-1845) and Colmeiro (1858), Maria Josefa *Lapiedra* became by marriage Mrs. *Martinez*, being a lady from Sanlucar de Barrameda, she received from Simon de Bojas Clemente remarkable instruction in botany. She translated to French the "Memoire on the culture of tobacco" by Sarracin, and she dedicated this translation to the celebrated botanist, Lagasca. In turn, Lagasca (1816) dedicated the genus *Lapiedra*, founded on the species *L. Martinezii*, in such a manner that the name of the genus corresponds to her family name and the specific name to the married name of this lady. Accordingly, the supposition of Herbert (1837), in which he says that generic name has been

[1] This list has been elaborated following the data from the work of Boissier (1839-1845), Willkomm and Lange (1861-1880), Colmeiro (1889), and Jahandiez and Maire (1931).

derived from a combination of the latin word *Lapis* and the Spanish word *piedra*, both meaning *stone*, is not tenable. Traub and Moldenke (1948) have suggested that possibly the name was invented by Lagasca from a combination of the Spanish words *la* and *piedra*, from the fact that the plants grow in rocky soil. Although, in reality, the name is composed of these two Spanish words it was not invented by Lagasca.

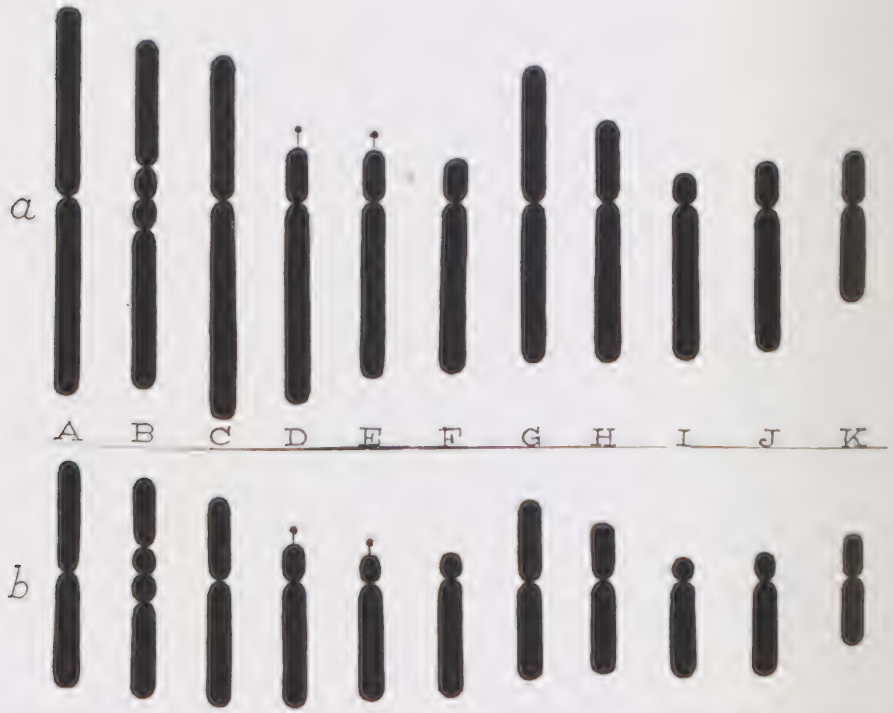

Fig. 10. Scheme representing the haploid idiogram of *Lapiedra Martinezii* Lag. *a*. Idiogram constructed from the chromosomes of a root tip plate. *b*. *Idem* from chromosomes of the first mitosis of the pollen. Notice the correspondence of the chromosomal types. $2n = 22 = 2:LL + 2:Ll + 2:Ll + 4:Lp' + 2:Lp + 2:ll + 2:lm + 4:lp + 2:mp$.

since, as we have pointed out, it corresponds to the family name of the Spanish lady. However, the choice of this name has been a happy one, for the name, apart from rendering homage to a distinguished lady, recalls nicely the ecology of the plant.

As Traub and Moldenke have noted, the opinion of most authors concerning the systematic position of the genus *Lapiedra* varied a great deal until 1888, the date when Pax placed it in his sub-tribe *Galanthinae*, comprising the genera *Galanthus* L., *Lapiedra* Lag. and *Leucojum* L.

In their recent study, Traub and Moldenke (1947) have elevated

the sub-tribe to the category of a tribe, with the name *Galantheae*, which includes, besides *Lapiedra* Lag., the two other genera *Galanthus* L., and *Leocojum* L. However, the enumeration of these genera follows the order *Lapiedra*, *Leucojum*, and *Galanthus*, since the authors consider the first to represent the most primitive member of the group. The same authors

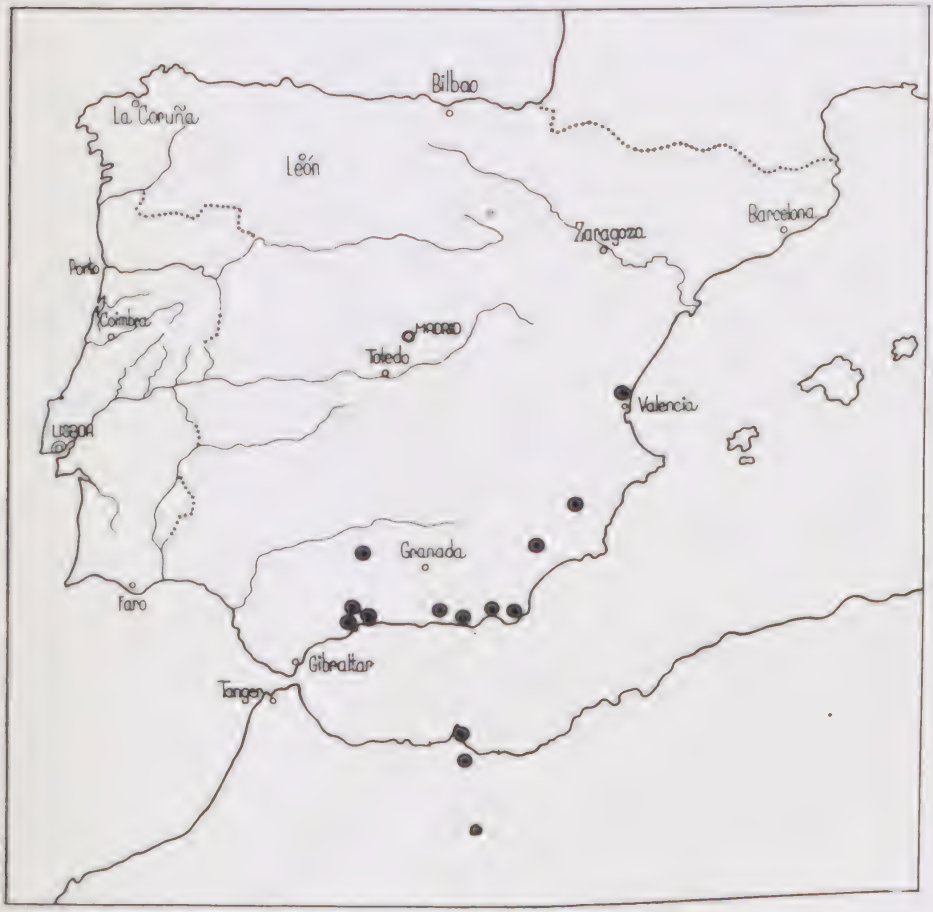

Figure 11. Geographic distribution of *Lapiedra Martinezii Lag.*

write that, at present, the systematic position of the genus *Lapiedra*, seems to be firmly established among the *Galantheae*, but they add that not all the evidence justifying this point of view has been assembled, since the chromosome complement of *Lapiedra Martinezii* Lag., was then unknown.

The cytology of the genus *Leucojum* L., has been studied especially by Heitz (1926), Satô (1918) and Neves (1939). According to the

studies of these authors, this genus has the basic numbers 7, 8, 9, and 11, and the complement is composed of rather long chromosomes, some of which are isobrachial, others heterobrachial, others cephalobrachial. In addition, one can state that species with a basic number of 7, possess a relatively higher number of isobrachial and heterobrachial chromosomes than do those species with a basic number of 9 or 11, when there is a preponderance of heterobrachial and cephalobrachial chromosomes.

Unfortunately, the cytology of the genus *Galanthus* is little known, since, of the 19 species enumerated by Traub and Moldenke, we know only the chromosomes of *G. nivalis* L. (Heitz, 1926, Transkowsky, 1930: Satô, 1937, 1938), G. *Cicilicus* Baker (Heitz, 1926) and G. *Elwesii* Hook. f. (Heitz, 1926; Satô, 1937, 1938), and *G. plicatus* (Satô, 1942). According to these studies, the basic number of this genus appears to be 12, and concerning the morphology of the chromosomes one can state that they clearly resemble those of species of the genus *Leucojum*.

A comparison of the idiogram of *Lapiedra Martinezii* with those of species of *Leucojum* and *Galanthus* shows that *Lapiedra* belongs to the same karyotype. Thus, the cytological data are in accord with the idea of considering the genus *Lapiedra* as belonging to the tribe *Galantheae* (Pax) Traub and Moldenke. From the fact that in *Lapiedra* the basic number is 11, the genus appears to be nearer *Leucojum* than *Galanthus*, and, in this connection, it has been noticed that the morphology of the chromosomes of *Lapiedra Martinezii* reveals a certain affinity with species of *Leucojum* having a basic number of 7, particularly with *L. autumnale*. This fact suggests perhaps, that the genera *Lapiedra* and *Leucojum* originated from a common ancestor. A study of our map of fig. 11, and map 5 of the work of Stern (1949) indicates that the data of geographic distribution of *Lapiedra Martinezii* and *Leucojum autumnale* are not opposed to this conception.

The genus *Lapiedra* has also been placed by Herbert (1837) adjacent to the genera *Gethyllis* L. and *Sternbergia* W. and Kit. Unfortunately, we have no knowledge of the cytology of the genus Gethyllis, but the chromosomes of *Sternbergia lutea* (L.) Ker-Gawl. have been studied by Yamamoto (1930), Nakajima (1936), Inariyama (1937), Satô (1938), La Cour (according to a citation from Darlington and Janaki-Ammal, 1945), Amico (1947), and in greater detail by Battaglia (1949), who presents, in his figure III, the idiogram of this species in a very precise fashion. Comparison of this figure with our fig. 10 shows that the idiograms of *Sternbergia lutea* (L.) Ker-Gawl. and *Lapiedra Martinezii* Lag. are different. Thus, the data from cytology are not in accord with the idea of considering the genus *Lapiedra* close to *Sternbergia* from the systematic point of view.

SUMMARY AND CONCLUSIONS

1. *Lapiedra Martinezii* a plant growing in the east and south of Spain and in the north of Spanish Morocco has 22 somatic chromosomes (11 gametic) and its idiogram can be expressed by the following formula:

$2n = 22 = 2:LL + 2:Ll + 2:Ll + 4:Lp' + 2:Lp + 2:ll + 2:lm + 4:lp + 2:mp$

2. A mixoploid root tip, having some longitudinal rows of tetraploid cells, has been found in a plant producing abnormal pollen. From the fact that this pollen has been produced as a consequence of the lack of the phragmoplast, the formation of tetraploid cells in the root tips has also been attributed to a total or partial lack of the phragmoplast in mitosis, followed by fusion of the daughter nuclei.

3. The cytological data are not in accord with the idea of considering the genus *Lapiedra* Lag. close to *Sternbergia* W. and Kit. from the point of view of systematics.

4. From the fact that *Lapiedra Martinezii* Lag. possesses a Karotype similar to that of *Leucojum* L. and *Galanthus* L., the cytological data justify the idea of considering the genus *Lapiedra* as belonging to the tribe *Galantheae* (Pax) Traub and Moldenke, in accordance with the ideas of Pax (1887) and Traub and Moldenke (1947).

5. The cytological characters indicate a closer relationship between *Lapiedra* and *Leucojum* than between *Lapiedra* and *Galanthus*. The analogies are very considerable with species of *Leucojum* having a basic number of 7, particularly with *L. autumnale* L. Thus, we have suggested that *Lapiedra Martinezii* Lag. and *Leucojum autumnale* L. have originated from a common ancestor. The data concerning geographic distribution is not opposed to this conception.

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ALLIUMS LISTED IN SOME EUROPEAN BOTANIC GARDEN SEED EXCHANGES — 1951

Bernard Harkness, *Chairman, Alliceae Committee*
Highland Park Herbarium, Reservoir Ave., Rochester 20, New York

(1) Cantonspaark, Baarn, Botanical Garden, State University of Utrecht — HOLLAND; (2) Botanical Garden of the City and of the University of Caen — FRANCE; (3) Botanical Garden University of Zagreb — JUGOSLAVIA; (4) Botanic Garden of the University of Copenhagen — DENMARK; (5) Botanic Garden of Berlin-Dahlem — GERMANY; (6) Botanic Garden of Leiden — HOLLAND; (7) Botanic Garden of Munich — GERMANY; (8) Botanic Garden, Groningen — HOLLAND; (9) Botanic Garden, Gothenburg — SWEDEN; (10) Botanic Garden, Istanbul — TURKEY; (11) Botanic Garden of the University of Wurzburg — GERMANY; (12) Nikko Botanic Garden, Nikko — Japan; (13) Botanic Garden, Lund — SWEDEN; (14) Botanic Garden of the University of Helsinki — FINLAND; (15) Botanic Garden, Uppsala — SWEDEN; (16) Royal Botanic Garden, Edinburgh — SCOTLAND; (17) National Botanic Gardens, Glasnevin, Dublin — IRELAND; (18) Royal Botanic Garden, Kew — ENGLAND; (19) Botanic Garden of the University of Zurich — SWITZERLAND; (20) Botanic Garden of the City of Dijon — FRANCE; (21) Jean Massart Experimental Garden, University of Brussels — BELGIUM.

ALLIUM

acuminatum—16; *acutangulum*—20; *albidum* (denudatum)—4; *albopilosum*—6—7—9—17—18; *ampeloprasum*—6; *ampeloprasum* var. *leucanthemum*—18; *amplectens*—4; *angulosum*—1—8; *aschersonianum*—16; *atropurpureum*—4—16.

beesianum—1—16—17—18; *bidwelliae* (campanulatum)—16—18; *bulgaricum*—18; *bulleyanum*—16.

caerulem—7—14—16—18; *caeruleum* var. *bulbilliferum*—9; *canadense*—1—4; *carinatum*—3—4—5—6—7—19—20; *cepa*—6—20—21; *cepa* var. *proliferum*—4—7—9; *cernuum*—4—6—9—15——16—17; *cernuum* var. *major*—16; *ciliatum* (subhirsutum)—17; *cilicicum*—7; *condensatum*—9; *cyaneum*—5—7—9—15; *cyrilli*—1—18.

dahuricum—17; *darwasicum*—15—17; *darwasicum album*—17; *decipiens*—6; *delicatulum*—4.

E, F, G, H, I, J, K & L. elatum—18; *farreri*—7—9—15—16—18; *fistulosum*—4—6—7—8—13—14—16—18—20; *fistulosum* f. *grande*—15; *flavum*—5—6—9—20; *forrestii*—1; *giganteum*—6—7—15—18; *glaucum*—18—20; *heldreichii*—1; *huteri*—7; *hymenorrhizum*—4—13—15; *insubricum* (narcissiflorum)—7; *jesdianum*—4; *Kansuense*—5; *karatavicnse*—4—5—8—9—13—14—15—16—17—18—21; *libani*—1.

macranthum—7—9—16; *magicum* (nigrum)—14; *margaritaceum*—6; *moly*—1—6—9—18; *moly* var. *bulbiferum*—7; *monophyllum*—16; *montanum* (senescens)—20; *multibulbosum* (nigrum ?)—9.

narcissiflorum—7—15—16—18—21; *neapolitanum*—6—16—21; *nigrum*—6.

obliquum—4—7—13—14—15—18—19—20; *odorum*—1—4—6—7—9—15—16; *oleraceum*—1—2—4—8—20; *olympicum*—10; *ophioscorodon* (scorodoprasum)—7; *oreophilum*—4—13—15—16; *oreoprasum*—4; *orientale*—5; *ostrowskianum*—7—8—16—18—21; *oxyphilum*—16.

paniculatum—6—8; *paniculatum* var. *longispathum*—4; *paradoxum*—4; *platyspathum*—15; *polyastrum*—16; *polyphyllum*—17; *polyrrhizum*—7—8; *porrum*—4—6—8—20—21; *przewalskianum*—9—15; *pskemense*—4; *pulchellum*—4—7; *purdomi*—9.

ramosum—18; *rosenbachianum*—4—13—16—17—20; *roseum*—5—6—17—20; *rotundum*—1—7—20; *rubrum*—6—16.

sativum—8—18—20; *sativum* var. *vulgare*—7; *schoenoprasum*—1—3—4—5—14—17—18; *schoenoprasum* var. *sibiricum*—9—10—15—16—18; *scordoprasum*—4—13—16—17—20; *scorzonerifolium*—18; *senescens*—4—6—9—10—13—15—16—17—18—19; *senescens* var. *glaucum*—17—18; *siculum*—4—17—18; *sphaerocephalum*—6—11—14—17—19—21; *stellerianum*—9; *stenanthum* (bolanderi)—17; *stipitatum*—4—6—7—16—19; *suaveolens*—7; *subhirsutum*—6; *suworowii*—7.

thibeticum—5—17; *thunbergii* (japonicum)—12; *triquetrum*—17; *tuberosum*—18.

U, V, W, Y & Z. unifolium—16; *ursinum*—3—4—18—21; *victorialis*—5—6—7—9—13—14—15; *villarsii*—6—15; *vineale*—2—4—9—16—20; *wallichianum*—9—16; *yunnanense* (mairei)—9—16; *zebdanense*—4—7—8—15—18—21.

VALLEEVUE AMARYLLIS TRIALS — 1951

THOMAS R. MANLEY, *Horticulturist*
The Garden Center of Greater Cleveland and
Western Reserve University

[FOR FIRST REPORT SEE PLANT LIFE (HERBERTIA EDITION) 7: 71—75. 1951.]

During the second season of the amaryllis strain trials test, observations were made to determine the ability of the varieties to recover from the forcing practices used to bloom the plants for the Cleveland Flower Show of 1950. Insomuch as the varieties were forced into bloom in 60 days from potting, it was interesting to note the ability of the plants to recover and bloom this season. During the vegetative season the plants were watered regularly and received weekly applications of liquid cow manure plus 1 tablespoon of 5-10-10 per 8″ pot each month, May through August.

Practically all the plants developed from 12 to 16 leaves during the season with bulb development equal in size or larger than those received from Holland.

Bulbs for trial from Ludwig & Co., Hellegom, H. DeGraaff & Son, Lisse, and Warmenhoven & Son, Lisse, Holland were repotted late in December after an 80-day rest period, during which time the foliage completely died down. The soil mixture used was equal parts of sand, clay loam, compost and rotten cow manure with one tablespoon of bone meal per pot. Watering began on January 1, 1951 with a blooming period of the Cleveland Flower Show on February 24 as the objective of the forcing period for the first scapes. The response to forcing the second season was not as uniform as the previous year; however, a large majority were in bloom for the show.

The named varieties of amaryllis vegetatively propagated represent the finest types of this flower available today. Five bulbs of each variety were studied to note variances in color or form. Care was taken to determine which variety was superior when certain named varieties nearly identical in color were observed. Due to the time and labor involved in the vegetative propagation of these bulbs it would appear more desirable to have just a few named varieties of very high quality and distinctiveness rather than the large number of similarly colored varieties available today.

The rating for 1951 tends to emphasize the very best of each color so that they may be recognized as superior. Based on our records, these should be used as standards for future selection and comparison for respective colors.

The letter rating of AA—Superior; A—Excellent; B—Good; C—Fair, for discard is based on clean color, floret size, number of scapes per

bulb, number of florets per scape, floret form, floret substance, length and texture of scape and vigor of bulb and foliage.

SALMON

Mona Lisa (Ludwig). A salmon, suffused pink. Color irregular and fades, 2 scapes 15", 3 to 4 five and one half inch blooms. 1950 rating—C; 1951—C.

Queen's Page (Warmenhoven). Clean salmon orange. 3 scapes, 20" tall with 4 eight inch blooms. Rating 1950—A; 1951—AA.

Salmonette (Warmenhoven). Listed in 1950 as Salmon Joy, a name duplication. Clear salmon with deeper salmon in throat. 2—3 scapes 24" tall with 4 to 6 eight inch blooms. Rating 1950—A; 1951—A.

Salmon Joy (Ludwig). Salmon scarlet, blending to deep red at base of petals, occasionally scratchy white line on throat, heavily substanced floret, wide open. 3 scapes, 22" tall with 4 nine inch blooms. Rating 1950—A; 1951—A.

Sweet Seventeen (Warmenhoven). Frosty salmon rose on white, giving a flesh pink tone to the floret. 3 scapes, 20" tall with 4 nine inch blooms. Rating 1950—B; 1951—A.

ORANGE SCARLET

Bordeaux (Warmenhoven). Clean light orange scarlet, blending to deep scarlet in throat. 2 scapes, 26" tall with 4 ten inch florets. Rating 1950—A; 1951—A.

Caruso (Ludwig). Orange scarlet intensifying at base of petals, slight striation at base of petals. 2—3 scapes, 24" tall with 4 eight inch blooms. Rating 1950—B; 1951—B.

Invincible (Ludwig). Smooth orange scarlet, blending to deep red in throat. 2—3 scapes, 22" tall with 4 nine inch florets. Rating 1950—A; 1951—AA.

SCARLET

Fire King (Ludwig). Scarlet, deepening to medium red in throat, floret long tubed. 2—3 scapes, 18" tall with 4 six inch florets. Rating 1950—B; 1951—A.

Halley (Ludwig). Clean, frosty scarlet with great substance and growth. 3 scapes, 22" tall with 3—4 eight and one half inch florets. Rating 1950—AA; 1951—AA.

Ludwig's Scarlet (Ludwig). Glistening scarlet, blending to deep red in throat, color breaks to yellow green at base of petals. 3 scapes, 26" tall with 4 seven and one half inch blooms. Rating 1950—B; 1951—B.

Prince of Orange (Warmenhoven). Scarlet, blending deep in throat, fades as floret ages. 3 scapes, 19" tall with 3—4 eight inch blooms. Rating 1950—B; 1951—B.

Scarlet Beauty (Warmenhoven). Scarlet, blending to medium red to dark red in throat. Possesses a velvety sheen that glistens. 3 scapes,

24″ tall with 4 nine inch blooms. Rating 1950—A; 1951—AA.

Scarlet Leader (Ludwig). Scarlet suffused with red, suffusion lines intensifying in throat. 3 scapes, 22″ tall with 4 seven inch blooms. Rating 1950—B; 1951—A.

Scarlet Triumph (Warmenhoven). Clear scarlet appearing nearly light red. Exceptional leathery substance to florets. 3 scapes, 24″ tall with 4 ten inch florets. Rating 1950—A; 1951—A.

PINK

Doris Lilium (Ludwig). Light rose pink deepening to rose in throat, very heavy substance. 3 scapes, 20″ tall with 4 six inch blooms. Rating 1950—A; 1951—A.

Fidelity (Ludwig). Pale rose pink with green at base of petals, clean color. 3 scapes, 14″ tall with 3 to 4 five inch blooms. Rating 1950—B; 1951—B.

Liberator (Ludwig). Salmon rose with deep rose red throat, mid ribs of lower petals white. Color appears as a suffusion of rose salmon on white giving a netted appearance. 3 scapes, 26″ tall with 3—4 seven inch blooms. Rating 1950—B; 1951—B.

DEEP ROSE

Fantasy (Ludwig). Rose and white bicolor, each petal has marginal half rose and throat creamy white. 2 scapes, 20″ tall with 4 five and one half inch blooms. Rating 1951—B.

Pink Perfection (Ludwig). Clear medium rose with lighter color toward the margin of the petals giving a pink halo effect. 2—3 scapes, 30″ tall with 4 seven inch blooms. Rating 1951—A.

Violetta (Warmenhoven). Medium to deep rose with a light rose throat. Light rose midribs. 3 scapes, 22″ tall with 3—4 eight inch florets. Rating 1950—B; 1951—B.

LIGHT AND MEDIUM RED

American Express (Ludwig). Huge, clean, medium red blending into deep red in throat. Substance excellent for large floret. 2 to 3 scapes, 28″ tall with 4 ten inch florets. Rating 1950—AA; 1951—AA.

Anna Paulowna (Warmenhoven). Glistening light salmon red with deep red throat. Fades as it ages. 2 to 3 scapes, 26″ tall with 4 eight inch florets. Rating 1950—B; 1951—A.

Brilliant (Ludwig). Very thick leathery light red with deep red in throat, occasional irregular white line on lip petal. 3 scapes, 24″ tall with 4 six inch florets, Rating 1950—B; 1951—B.

Mothers Day (Ludwig). Medium rose red, deepening to crimson red in throat with white striping at base of petal. Irregular flecks of darker red to violet red appear in petals. 2—3 scapes, 20″ tall with 3—4 six-inch florets. Rating 1950—B; 1951—B.

Orange King (Warmenhoven). Light red that loses its color as the florets age giving a blue gray sheen. 2—3 scapes, 18″ tall with 4 eight inch florets. Rating 1950—B; 1951—A.

Orange Wonder (Ludwig). Light red blending into a pink to white throat. Color combination is odd and blending not too smooth. 2 scapes, 21″ tall with 4 five inch florets. 1950—C; 1951—B.

Shakespeare (Ludwig). Glistening medium red, blending to deeper red in throat, white line on some petals most prominent in throat. 3 scapes, 18″ tall with 4 six inch florets. Rating 1950—A; 1951—A.

DARK AND WINE RED

Lucifer (Warmenhoven). Medium dark red of great substance. 2 scapes, 19″ tall with 4 eight inch florets. Rating 1950—B; 1951—B.

Moreno (Warmenhoven). Medium dark red with flight suffusion of rose red in throat. 3 scapes, 26″ tall with 4 eight inch florets. Rating 1950—AA; 1951—A.

Mysterie (Warmenhoven). Rose red, blending to deep red in the throat. Midribs and tips of petals are rose. 2 scapes, 20″ tall with 4 seven inch florets. Rating 1950—B; 1951—B.

Red Master (Warmenhoven). Huge dark red of great substance with flat florets. This variety possesses the deepest color of any amaryllis tested up to the present. Its floret size may be due to its inability to hold over 3 florets per scale. 2 scapes, 24″ tall with 2—3 eleven to twelve inch blooms. Rating 1950—AA; 1951—AA.

WHITE

Casper Ludwig (Ludwig). Pure white with yellow green line in throat. 3 to 4 scapes, 16—20″ tall with 4 five inch blooms. Rating 1950—B; 1951—B.

Early White (Ludwig). Very early pure white with faint green tinge deep in throat, good substance. 3 scapes, 22″ tall with 4 to 5 six and one half inch blooms. Rating 1950—A; 1951—A.

Joan of Arc (Warmenhoven). Pure glistening white with green in throat. 2—3 scapes, 24″ tall with 4 to 6 seven and one half inch blooms. Rating 1950—A; 1951—A.

Leading Lady (Warmenhoven). Wide open pure white with green throat. 3 scapes, 20″ tall with 3 to 4 seven inch blooms. Rating 1950—B; 1951—B.

Mount Tacoma (Warmenhoven). Pure white with faint green tinge in throat. Petals are winged at base, 3 scapes, 24″ tall with 4 seven inch blooms. Rating 1950—A; 1951—A.

Queen of the Whites (Warmenhoven). Glistening waxy pure white with faint tinge of green in throat, blooms flat with slight recurve at tip. 3 scapes, 25″ tall with 4 to 5 nine inch blooms. Rating 1950—AA; 1951—AA.

Snow Queen (Ludwig). Pure white with faint green tinge. 3

ablaze with *Zephyranthes* blooms, but we did not gather any there at the time."

This species appears to be of the easiest culture and should become a standby out of doors in southern climates, and a fine pot plant in the North. The species has been appropriately named in honor of Mrs. Morris Clint, an enthusiastic plant explorer and gardener in the Lower Rio Grande Valley of Texas.

Zephyranthes clintiae Traub, **sp. nov.**

Herba bulbosa; foliis angustis usque ad 47 cm. longis, 2—3 cm. latis; umbella uniflora; floribus erectis ab roseis usque ad roseo-purpurescentibus variis; spatha in parte inferiore 2/3 connata, supra bifida, usque ad 2.6 cm. longa; pedicello 1.7—2.6 cm. longo; tubo tepalorum 1.9 cm. longo sursum ampliato; segmentis tepalorum spathulato-oblanceolatis 2.5—3 cm. longis, 1.3—1.7 cm. latis; staminibus 1—1.2 cm. longis; stylo staminibus longioribus 2 mm. breviore; stigmate trifido, lobis globulosis. Traub nos. 202 & 203; Plate 6.

Bulbous herb; leaves narrow concave on upper surface, erect, rush-like, up to 47 cm. long, 2—3 mm. wide; peduncle 16.5—19.5 cm. tall at anthesis, elongating up to 43 cm. in fruit; umbel 1-flowered; flowers upright, up to 4.9 cm. long, varying in color from Tyrian Rose (RHS 24/2) to Solferino Purple (RHS 26/1); spathe purplish, united in lower 2/3, bifid above, 2.5—2.6 cm. long; pedicel 1.7—2.6 cm. long; ovary 5—7 mm. long; tepaltube 1.9 cm. long, enlarging upwards; tepalsegs spatulate-oblanceolate, 2.5—3 cm. long, 1.3—1.7 cm. wide; stamens, style and stigma white; stamens of 2 different lengths, 1 cm. and 1.2 cm., long; anthers versatile; style 2 mm. shorter than longer stamens; stigma trifid, lobes short, globulose; capsule about 1.2 x 2 cm.; seeds numerous, black. Type: Traub nos. 202 and 203; in the Traub Herbarium; type illustration: Plate 6.

Range.—Mexico; a few miles east of Cuidad del Maiz, Morelos, San Luis Potosi.

Notes.—Flowered in July, Aug., Sept., and Oct. 1951. This species is similar to *Zephyranthes fosteri*, with sessile ovary, but *Z. clintiae* can be easily distinguished by its 1.7—2.6 cm. long pedicel. Mrs. Clint has observed one flower of *Z. clintiae* with a 4-lobed stigma.

EXPLORING FOR MEXICAN ZEPHYRANTHES

Mrs. Morris Clint, *Brownsville, Texas*

On an orchid collecting expedition in Mexico during April of 1947, my husband and I were lucky enough to find in bloom some very interesting *Zephyranthes*. Fortunate, indeed, as on numerous visits to the same territory not a single blossom could we find.

We spotted our first bulbs along the San Luis Potosi Highway, about 25 miles from Antigua, Morelos, in a tropical rain forest area. Altitude is approximately 2500 feet. Mountains are heavily wooded with giant oak trees, which are covered with various mosses, ferns, bromeliads and orchids. During the months of October and November flower sprays of the lovely *Laelia anceps* turn this place into a veritable fairyland. Our bulbs chose the more open spaces, where they received a fair amount of sunlight. They were growing singly in small soil pockets between rocks in the bar pits at the foot of the mountain. Soil was a rich sandy loam, covered with a thick layer of leaf mold. We gathered only a few bulbs, as they were widely scattered and hard to dig, and twenty-five miles of difficult mountain driving still remained ahead of us before reaching our destination, the "Majalis Country."

Here, indeed, is a completely different region. Not far from Ciudad del Maíz, the home of the very beautiful *Laelia majalis* (*L. grandiflora*) and the lovely *Epidendrum mariae* Ames is on the dry side of the mountain range. Altitude is about 4000 feet. This area appeared barren and desolate to us after the lush tropical beauty of the "Anceps Country," so imagine our surprise and delight to find *Zephyranthes* blossoms literally everywhere. There were several large colonies growing in full sun in the corral of the ranchito where we stopped for guides; there were scattered blooms in the semi-shade of nearby Canyon del Borrego, and a rocky slope between these areas was ablaze with their color. Two neighboring mountains were explored for superior varieties of *Laelia majalis* but no rain lilies were observed. Perhaps their range was confined to a comparatively small area, one half mile across, or possibly the adjacent regions had not received the same recent shower. Soil on the slope was a light sandy loam, while that in the valleys was heavier and roughly gritty.

We soon noticed that the flowers varied rather widely in color and form, so we endeavored to collect each variation seen. Cultivation appears to have enhanced these differences. Flowers were small, pink to rose red, and were carried on five or six inch stems. All were blooming without leaves.

In our garden they have adapted themselves quite nicely. They become temperamental only when a few necessary requirements are not given, sulking underground for months after being over watered, or

Plate 7 Habitat of *Zephyranthes clintiae* Traub.

(Upper) View of Valley known as "Puerto de Lobos," taken from slope where we have gathered many of our *Zephyranthes*, including M-471 (*Zephyranthes clintiae* Traub), also *Laelia majalis* and *Epidendrum mariae* Ames. Elevation approx. 4500 ft., 50 miles from Antigua, Morelos, on San Luis Potosi Highway, in the State of San Luis Potosi.

(Lower) Looking toward south from part way up slope. This territory is on the western or dry side of mountain; bushes in foreground are scrub huisache. Around the next bend in the road is Canyon de Borregos, Ciudad del Maiz, about 3 miles away.

gradually wasting away in too much shade. With us, they are virtually evergreen. Bloom is always contemporary with the leaves and is not limited by rainfall. Bulbs frequently send up intermittent off season flowers, but our heaviest bloom is in July and August. Our blossoms range from a light pink with a white center to a dark wine red. Seeds set easily except on one type, which has so far defied all efforts. This variety has a large cup-shaped flower, light salmon pink in color.

In August of this same year my son, Morris, Jr., found a small colony of a very charming rain lily growing in a creek bed near El Sol, which is a few miles north of Tamazunchale in the southern tip of the State of San Luis Potosí. As search for others in the immediate neighborhood proved fruitless, we wonder if these few bulbs or their seed were not washed down from their natural home, perhaps many miles away. The flowers are quite large for a *Zephyranthes*, near RHS Fuchsine Pink 627/2, with a white center, and are carried on tall, stout stems. They appear in the absence of leaves, during late June, July and August. The blooms last for several days, which is rather unusual in this locality. Seeds are freely produced.

Very shortly after our bulbs were collected, the Mexican Government was forced to institute a strict quarantine against the transportation of plants and fruit within their borders in an effort to prevent the spread of the Black Fly, a serious menace to their citrus industry. We are hoping complete control of this pest will soon allow us once more to go in search of our elusive little *Zephyranthes*.

Meantime, Dr. Traub is studying our bulbs and will shortly tell us more about them.

(EDITORIAL NOTE.—Since this was written in December 1950, one of the species has been determined as new to science and has been named, *Zephyranthes clintiae* as reported in the preceding paper.)

LYCORIS NOTES

Hamilton P. Traub, *Maryland*

Some progress has been made toward clearing up the nomenclature of the *Lycoris* species now being grown and propagated in Europe and the United States. Mr. Sam Caldwell, of Nashville, Tenn., and Mr. Wyndham Hayward, of Winter Park, Florida, both enthusiastic lycoris growers, are assisting with the project to solve the remaining *Lycoris* name problems.

Under date of August 12, 1950, Mr. Caldwell writes, "This is just to advise you that I have now had bloom stalks on two groups of *Lycoris incarnata* bulbs—both from van Tubergen in Holland. One group of three has been in an 8-inch pot since 1947; the other group of seven was

Lycoris straminea Lindl. (P). Photo by Mrs. Cecil Houdyshel.

Plate 8

planted outside in the ground last fall. There is just one stalk from each group, but it is the first time I have had a bloom on any of my bulbs labeled "*L. incarnata*." The flowers are identical with those on the bulbs received from Wyndward Hayward, labeled "*Lycoris squamigera purpurea*"—examples of which I sent you by air mail last week. You had tentatively identified these from my kodachromes as *Lycoris incarnata*, and now the flowering of van Tubergen's *Lycoris incarnata* confirms your verdict. It is good to get at least a little confusion cleared up. Now with Hayward's *Lycoris squamigera purpurea* turning out to be *L. incarnata*, and Houdyshel's *Lycoris purpurea* turning out probably to be *L. sprengeri*, as you suggested, we'll have to wonder just who does have and what is the real *Lycoris squamigera purpurea*."

Under date of August 28, 1950, Mr. Caldwell writes, "Here's a little additional information on the lycoris season here: On August 22 I had three scapes on my outdoor planting of '*Lycoris purpurea*' from Cecil Houdyshel. They were very beautiful. We have had much cool, rainy weather, and the intense blue, so evident in these flowers last year, was even more prominent this season. At the same time my single potted bulb of *L. sprengeri*, from van Tubergen, bloomed for the first time—a single scape with 6 flowers in the umbel. It is *identical* with the Houdyshel lycoris, confirming again your opinion based on an examination of my Kodachromes some time ago, that Houdyshel's "*L. purpurea*' is really *L. sprengeri*. This is a fine lycoris—about a month later to bloom with us than *L. squamigera*—and apparently suitable both for pot and outdoor culture in this climate, which I believe is a little more severe in the winter than that of Washington, D. C. The scapes are about 17 inches tall; of the four, one had five flowers, two had six and one had seven. I think they are going to make good seeds—they did last year, though I lost the seedlings from damping off."

Thus it will be noted that *Lycoris incarnata* and *L. sprengeri* have been identified. The reader is referred to Plate 14, page 171, Traub & Moldenke, AMARYLLIDACEAE: TRIBE AMARYLLEAE, 1949, for good illustrations of these two species. In *Lycoris incarnata* the apexes of the tepalsegs are acute, and the color is soft flesh-colored, or light rose; whereas in *Lycoris sprengeri* the apexes of the tepalsegs are more rounded, the color defies description—polychrome, vivid-rose in the throat, otherwise purple and carmine with suffusions of Prussian Blue, Cyanin Blue).

Over a hundred years ago, Lindley described *Lycoris straminea* Lindl. (in Jour. Hort. Soc. Lond. 3: 76. 1848; descr. in Traub & Moldenke, AMARYLLIDACEAE: TRIBE AMARYLLEAE, 1949, page 178). This species was never illustrated and so far all attempts by the writer to locate plants of this species have failed. However, Mr. Caldwell, under date of Aug. 28, 1950, also reported that he has flowered a "faintly strawy colored" species, which he originally obtained from Bob Anderson of Los Angeles, now deceased." This may be the long lost *Lycoris straminea*. The bulbs introduced by the USDA as *Lycoris albiflora*, now supplied by Cecil Houdyshel, of La Verne, Calif., may also belong here

[Plate 8]. Hayward, in a private communication states that the flowers are "nearly clear white." It is hoped that those who are interested in *Lycoris* will report their experiences so that the remaining confusion of names may be straightened out in the near future.

AMARYLLID NOTES

HAMILTON P. TRAUB, *Maryland*

Haemanthus longifolius (De Wild. & Th. Dur.) Traub, **comb. nov.**; syn.—*Demeusea longifolia* De Wild. & Th. Dur., in Bull. Soc. Bot. Belg. 39: 78—79. 1900.

xHaemanthus nicolaii Traub, **hybr. nov.**, syn.—*Haemanthus hybridus* Wittmack, in Gartenflora (1900), p. 113, pl. 1472, fig. 19c & 20c. (*H. puniceus* ♀ et *H. katherinae* ♂).

Hymenocallis caymanensis Herb., Amaryll. 214. 1837, [syn.—*Hymenocallis keyensis* Small, S. E. Flora, pp. 322, 1503. 1933, *nomen subnudum* (Small failed to indicate the width of the leaves, a necessary diagnostic character in this genus.). Leaves 3.2 cm. wide at the base, (7)—7.5 cm. wide somewhat above the middle, apex acute; umbel (6)—10—16—flowered. Type: Chapman, So. Fla. cult., nos. 325 and 326 (= U. S. Nat'l Herb. nos. 932753 and 932754). Here belongs also Chapman. So. Fla. cult., sandy coast, 1875 (= U. S. Nat'l Herb. no. 968975).]

Subgenera and sections of Zephyranthes. In the past it has sometimes been the practice to establish a new genus whenever some interesting structural difference or differences were observed in plant species, without insisting that such a difference or differences *must represent a distinct gap* if they are to be used as the basis of generic distinction. One of the most glaring examples is of course the attempt of Herbert to elevate *Brunsvigia rosea*, the Cape Belladonna, to generic rank for purely sentimental reasons, on the basis of slight specific differences only. In the genus *Zephyranthes*, the genus *Cooperia Herb.*, was based primarily on the presence of a relatively long tepaltube and erect anthers. Later it was shown that gene exchange (crossing) can take place between this group and the typical section of *Zephyranthes*, and that there are species intermediate between the two. This was recognized by D. Don as early as 1836. Similarly, the differences between the typical section of *Zephyranthes* and two other groups are not sufficient for generic distinctions. *Pyrolirion* Herb., was reduced to a subgenus of *Zephyranthes* by Baker (1888) on that basis, and *Haylockia* Herb., is similarly reduced here in harmony with the proposal of D. Dietrich (Syn. Pl. 2: 1176. 1840). The expanded genus *Zephyranthes*, recognizing the propo-

sals of D. Don (1936), Baker (1888) and the proposal of Dietrich (1840), concerning *Haylockia* Herb., which is a *Zephyranthes* with the peduncle hidden in the neck of the bulb, is summarized in the following key to the subgenera and sections.

KEY TO THE SUBGENERA AND SECTIONS OF THE GENUS ZEPHYRANTHES

Genus ZEPHYRANTHES: perigone limb radially symmetrical; stamens subequal or of two sets of lengths; tepalsegs subsimilar [type: *Z. atamasco* (L.) Herb.].

1a. Anthers dorsifixed, versatile; perigone erect, suberect or horizontal; tepaltube usually short:

2a. Stamens subsimilar; upper portion of tepaltube dilated; style straight; stamens erect to suberect; anthers medianally dorsifixed [type: *Z. tubiflora* (L'Herit.) Schinz]:

Subgenus I. PYROLIRION (Herb.) Baker
Amaryll. 30: 37—38, 1888.

3a. Peduncle longer than the neck of the bulb [type: *Z. tubiflora* (L'Herit.) Schinz] ..... Sect. 1. EUPYROLIRION Traub
PLANT LIFE 7: 43. 1951.

3b. Peduncle included in the neck of the bulb [type: *Z. pseudocolchicum* Kraenzl] ..... Sect. 2. BRACHYLIRION Traub
PLANT LIFE 7: 43. 1951.

2b. Stamens of two sets of lengths:

4a. Peduncle longer than the neck of the bulb; [type: *Z. atamasco* Herb.]:

Subgenus II. EUZEPHYRANTHES Aschers. & Graebn.

5a. Perigone erect or suberect; stamens erect or suberect:

6a. Functional stamens 6:

7a. Stigma trifid, lobes filiform [type: *Z. albicilla* Traub] ..... Sect. 1. FILISTIGMANTHES Traub sect. nov. ..... stigmate trifido, lobis filiformibus.

7b. Stigma trifid, lobes not filiform [type: *Z. atamasco* (L.) Herb] ..... Sect. 2. ATAMASCO (Adan. ex Greene) Traub, PLANT LIFE 7:43. 1951.

6b. Functional stamens 3: [type: *Z. minima Herb.*] ..... Sect. 3. TRISTEMANTHES Traub
PLANT LIFE 7: 43. 1951.

5b. Perigone, stamens and style horizontal [type: *Z bifolia* (Aubl.) Roem.] ..... Sect. 4. SIBONAYA Traub
PLANT LIFE 7: 43. 1951.

4b. Peduncle hidden in the neck of the bulb [type: *Z. pusilla* Dietr.]:

Subgenus III. HAYLOCKIA (Herb.) Traub
PLANT LIFE 7: 43. 1951. ..... [not divided into sections]

1b. Anthers erect, basifixed; perigone erect; tepaltube usually relatively long [type: *Z. brazosensis* Traub. PLANT LIFE 7: 43. 1951]:

Subgenus IV. COOPERIA (Herb.) Traub
PLANT LIFE 7: 43. 1951.

8a. Filaments free [type: *Z. brazosensis* Traub] .... Sect. 1. EUCOOPERIA Traub
PLANT LIFE 7: 43. 1951.

8b. Filaments slightly united in lower part [type: *Z. albicans* (Herb.) Baker] ..... Sect. 2. PARANDRANTHES Traub
PLANT LIFE 7: 40. 1951.

The classification of the species within the subgenera and sections is relatively easy, except for the sections *Atamasco* and *Filistigmanthes* of the subgenus *Euzenphyranthes*. This is due to the incomplete or faulty description of the stigma in many cases in the literature. It will be necessary to examine the type specimens whenever possible to bring order out of the present chaos since the unreliable criterion of the relative length of the perigone was largely used by Baker (1888) in his classification.

Fig. 12. *Zephyranthes*, subgenus *Cooperia*, seed capsules (A) *Zephyranthes brazosensis* Traub; (B and C) *Zephyranthes brazosensis* var. *chlorosolen* (Herb.) Traub, *comb. nov.;* and (D) *Zephyranthes brasiliensis* Traub. All approx. natural size.

Zephyranthes seed capsules. In the subgenus *Cooperia*, of the genus *Zephyranthes*, the seed capsules are of real diagnostic value since they are quite distinctive for most species. In Fig. 12, the seed capsule of *Zephyranthes brasiliensis* (Fig. 12-D) from Brasil, is compared with those of *Zephyranthes brazosensis* Traub (syn.—*Cooperia drummondii* Herb.) (Fig. 12-A) collected in Texas, and its variety, *Zephyranthes brazosensis* var. *chlorosolen* (Herb.) Traub, comb. nov. (syn.—*Cooperia chlorosolen* Herb., Bot. Reg. Lond. *plate 1835*. 1836) (Fig. 12-B & C). from two different localities in Texas.

REGISTRATION OF NEW AMARYLLID CLONES

Registrars: Dr. J. B. S. Norton and Prof. W. R. Ballard

This information is published to avoid duplication of names, and to provide a space for recording brief descriptions of new Amaryllid clones. Names should be as short as possible—one word is sufficient. It is suggested that in no case should more than two words be used. *The descriptions must be prepared in the form as shown in the entries below, and must be typewritten and double-spaced.* The descriptive terms used

should be in harmony with those given in the "Descriptive Catalog of Hemerocallis Clones, 1893-1948" by Norton, Stuntz and Ballard.

There is close liaison between the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY regarding the registration of new *xHemerocallis* clones. By cooperative arrangement with the HEMEROCALLIS SOCIETY, beginning with the 1951 HERBERTIA edition, descriptions of only such *xHemerocallis* clones for which the registration fee has been paid to Registrar, Mr. Wilmer B. Flory, 1533 Meadowlawn Ave., Logansport, Ind., will be registered, and numbered (example: 3322-R). The number "3322" indicating the number of the clone and the "R," the information that it is registered. The registration fee is required *only* in the case of *xHemerocallis* clones, and *not* for other amaryllids which are registered free of charge by the AMERICAN PLANT LIFE SOCIETY. It should be noted that in a free country such as ours, registration is *entirely voluntary*, and does not replace the right of anyone to publish names with descriptions in recognized publication media elsewhere and thus obtain priority under the generally recognized INTERNATIONAL RULES OF BOTANICAL NOMENCLATURE which cover all plant names.

Correspondence regarding new amaryllid clones, including *Hemerocallis*, to appear in HERBERTIA should be addressed to Prof. J. B. S. Norton, 4922 40th Place, Hyattsville, Maryland, *enclosing self-addressed, stamped envelope, if reply is expected.*

For obvious reasons, there is a limit to the number of descriptions included from any one member in any one issue. Not more than six brief descriptions of clones under each generic heading will be published from any one member in any one issue of HERBERTIA. Descriptions of clones in excess of five brief descriptions, up to a total of 25, will be entered if the space required for each is limited to one line. In this case use should be made of the standard abbreviations already mentioned.

HYBRID ALSTROEMERIAS

xAlstroemeria racinae Traub, **hybr. nov.**

Described and illustrated, by M. B. Foster, in PLANT LIFE 6(HERBERTIA) : 86—87, plate 13. 1950. (*A. caryophyllaea* Jacq. x *A. pulchella* L. f.). This fine fragrant hybrid has been appropriately named in honor of Mrs. Racine Foster (Mrs. Mulford B. Foster), of Orlando, Florida.—*Hamilton P. Traub*

xCRINODONNA CLONE

xCrinodonna corsii clone DOROTHY HANNIBAL, Traub, **cl. nov.**

[*Crinum moorei* x *Brunsvigia rosea* var. *minor*]—Planta bulbosa; bulbo satis parvo; foliis lanceolatis 5.8—8.5 dm. longis, medio 4.2—4.8 cm. latis; pedunculo complanato 54 cm. alto, marginibus rotundatis; umbella 18-flora; spatha bivalvata ca. 10 cm. longa; pedicellis 2.5—6 cm. longis; ovario 1.5 cm. longo; flore rubello; tubo tepalorum 4—4.8 cm. longo, 2.7—3 cm. lato; staminibus declinato-adscendentibus; stylo stamina longissima circiter aequanti; stigmate minuto.

Crinum Moorei x *Brunsvigia rosea* var. *minor*. Bulb relatively small; leaves lanceolate, 5.8—8.5 dm. long, 4.2—4.8 cm. wide at the middle; peduncle flattened with rounded edges, 54 cm. tall; umbel 18-flowered; spathe 2-valved, about 10 cm. long; pedicels 2.5—6 cm. long; ovary 1.5 cm. long; flowers pink; tepaltube 4—4.8 cm. long, 2.7—3 cm. wide; stamens declinate ascending; style about as long as the longest stamens; stigma minute. Type: nos. 133, 134, 138 & 139 in the Traub Herbarium.—*Hamilton P. Traub*

HYBRID AMARYLLIS CLONES

Introduced by Mrs. Mary G. Henry, Gladwyne, Penna.

xAmaryllis gladwynensis clone MARY DAVIS, M. G. Henry, **cl. nov.** This is the type plant of this hybrid described and illustrated in PLANT LIFE 7: 118—121, plate 18, right. 1951. It is the first clone of the hybrid to be named, and is named in honor of Mrs. Mary Davis, daughter of Mrs. Mary G. Henry.

xAmaryllis henryae clone ELIZABETH TRAUB, M. G. Henry, **cl. nov.** This is the type plant of this outstanding hybrid described and illustrated in PLANT LIFE 7: 117—118, fig. 22. 1951. This clone is named in memory of the late Mrs. Elizabeth Graf Traub, mother of Dr. Hamilton P. Traub.

HYBRID HEMEROCALLIS CLONES

TRIAL GARDENS. Cooperative daylily trial gardens have been established at (1) *Cornell University, Dept. of Floriculture, Ithaca, N. Y.*; (2) *University of Florida, Dept. of Horticulture, Gainesville, Fla.*; (3) *Southwestern Louisiana Institute, Dept. of Horticulture, Lafayette, La.*; (4) *Whitnall Park Arboretum, Milwaukee City and County Park Board, Milwaukee, Wisc.*; (5) *Texas A & M College, Dept. of Horticulture, College Station, Texas*; (6) *Des Moines Park Board, Des Moines, Iowa*; (7) *Los Angeles Arboretum, Arcadia, Calif.* [Complete addresses are given under *Officers and Committees, below.*]

Introducers should send complete collection of hybrids to these co operating agencies in order that the new daylily clones may be impartially evaluated.

THE AMERICAN PLANT LIFE SOCIETY numbers the clones known to be published, including those registered and not registered, in various publication media. It is thus an easy matter to report the approximate number of named clones as of any date. Beginning in 1953, such a report will be made as of July 1 in each year.

Introduced by Stanley E. Saxton, Saxton Gardens, Saratoga Springs, N. Y.

DAMASCUS. A trumpet shaped flower of pale buff lightly flushed and veined in peach and pink tones. Well branched with 30 to 35 buds. Blooms late on 45" stems [3503-R].

KARISTA. Large, very wide petaled flower, with a ground of golden yellow heavily flushed red like a ripe peach. Well branched 30" stem. Early midseason. [3504-R].

MEDALLION. Large open, flat faced flower of Tangerine Orange (RHS 9) with veins and throat flush of Light Indian Orange (RHS 713-1). Overlapping petsegs 2" wide, sepsegs 1¼" wide. Stem 36". Early midseason. [3505-R].

SYLVAN. A regular recurved medium large flower of Rose pink. The sepals are a shade lighter than the petals which have a milk white midrib. Small canary yellow throat. A smooth flower with a satiny finish. Blooms late on 38" stems. [3506-R].

WILL SCARLETT. Medium large flower of scarlet red. Form regular. segments somewhat recurved. There is a small golden throat. Stems 30". late midseason. [3507-R].

Introduced by Dr. J. B. S. Norton, Hyattsville, Md.

FORERUNNER. 20 inches high, very early, light yellow, segments tapering, inflorescence much branched for so early a clone. [3508-R].

GREAT LIGHT. 45 inches high, midseason to late, large pale yellow flowers open from late afternoon for 18 to 20 hours. [3509-R].

QUEEN MARJORIE. 30 inches high, early midseason, outer segments yellow, inner ones dark violet red; a large early bicolor with pronounced color contrast. [3510-R].

PURE GOLD. 35 inches high, early midseason, late to very late, clear yellow, wide segments, extended bloom. [3511-R].

WINEMAKER. 28 inches high, very late, dark violet red, full flower segments margins fluted. [3512-R].

Introduced by Ida L. M. McClure, Williamsville, N. Y.

CARESS. A very light yellow, cup shaped flower, with outer half of petals deeply washed with rose-beige on the upper surface; sepals almost untouched with color; 30-inch scape; 3½-inch flower; flowers on short branches along the scape; neat foliage. Mid July. An attractive flower, well worth protection from mid-day heat. [3513-R].

PINK CHIFFON. [PINK ANGEL x SU-LIN]. Drooping frilled petals: sepals standing upright; very pale pink; scape to 36 inches; flower 4½ inches; well budded. [3514-R].

RHODA LEE. A blend of three good reds; scape 30 inches; flower 4 inches; late mid-season. [3515-R].

NIGHT BIRD. Light yellow; flower horizontal, has the longest tube of any flower I have yet seen; has the effect of a bird perched on the plant. *A. citrina* hybrid; blooming in the evening but lasting well into the afternoon of next day. It carries the light fragrance of *citrina;* scape four inches; mid-season. [3516-R].

Introduced by J. C. Stevens, Greenville, N. Y.

PINK DAMASK. 36": midseason; Jasper Pink (Ridgway), 5" self colored bloom, moderately branched, sturdy scapes having 12-15 buds: deciduous dark green foliage; July 15—Aug. 10. [3517-R].

Introduced by Ralph W. Wheeler, Winter Park, Florida.

STAR OF EVE. 42": ERe; YL1. Pale yellow star shaped night bloomer. An evening flowering daylily in the form of a six-pointed star. Sepals and petals are wide the sepals being folded lengthwise or rolled

and the petals somewhat pinched. The flower is large opens with a flat face both sepals and petals being pointed. The color is very light lemon yellow. Stems are 42". Growth is vigorous and flowering stems are numerous. Semi-deciduous in Florida and usually remontant. [3519-R].

AMARYLLID GENERA AND SPECIES

Harold N. Moldenke

[IN THIS DEPARTMENT THE DESCRIPTIONS OF AMARYLLID GENERA AND SPECIES, PARTICULARLY RECENT ONES, TRANSLATED FROM FOREIGN LANGUAGES WILL BE PUBLISHED SO THAT THESE WILL BE AVAILABLE FOR USE BY THE READERS.]

DIPHALANGIUM S. Schauer, Linnaea 19: 702—703. 1847. Perianth corolla-like, salver-shaped, regular, marescent, the tube cylindric, subventricose at the middle, 6-costate, the limbs 6-parted, the segments (ligulate?) spreading, almost equal, longer than the tube, 1-nerved, callous-thickened at the apex; stamens 6, inserted in 2 series, diadelphous, evidently ternate, coherent at the base; filaments adnate to the tube, very short or even practically absent; anthers bilocular, introrse, linear-oblong, basifixed on the back; ovary ovate-pyramidal, 3-lobed, 3-celled; ovules very many; style continuous, erect, long, sulcate, thickened at the apex; stigma trigonous, dilated; *capsule connate with the perianth-tube from the base to the middle*, 3-sided, 3-celled, many-seeded. Close to the genus *Milla* Cav. and to be placed between this and *Tristagma* Poepp.

Diphalangium graminifolium S. Schauer, Linnaea 19: 703. 1847. Type, Aschenborn 30, from Mexico. Bulb-tuber almost round, the fibers of the dark tunic linear, parallel; leaves filiform, canaliculate, incurved-patulous, almost equaling the scape; scape simple, scarcely half an inch long, terete, bearing at the base a pair of opposite, small, membranous, very thin acuminate leaflets, otherwise completely naked, terminated by the flower; perianth white (?), the segments an inch long, containing a thick midrib, otherwise very thin, the tube continuous with the peduncle (that is, the upper part of the scape), half inch long, the ribs herbaceous, the intervening portions membranous; anthers white, exserted to the sinuses of the perianth; style almost half as long as the limb of the perianth.

Haemanthus mildbraedii Perk., Wiss. ergeb. deut. zentr. afr.-exped. 1907-1908. 2: 64. 1910. Bulb globose, about 1.5 cm. in diameter; leaves 2, contemporaneous with the flowers, oblong, short-acuminate, membranous, 13—14 cm. long, 6—7 cm. wide; petiole 17—18 cm. long, slender, surrounded at the base by a tubular sheath which is 7 cm. long

and purple-spotted; scape lateral, slender, 23—24 cm. long, 2 mm. wide, cylindric; flowers red (according to Mildbraed), arranged in about 12—14 flowered umbels; valves of the spathe narrowly lanceolate, before withering, acute; pedicel 1—1.7 cm. long; tube cylindric, short, about ⅓ shorter than the segments of the perigonium, the segments linear or lanceolate, 16 mm. long, 1.5 mm. wide, acute, reflexed; filaments 22 mm. long, filiform, about half again as long as or twice as long as the segments of the perigonium; anthers ovate, scarcely equaling 2 mm. in length; style filiform, slightly shorter than the filaments. Central Africa.

Haemanthus andrei De Wild., in Ann. Mus. Congo ser. 5(3): 173. 1910. Bulbous; scape erect, red-spotted, about 20 cm. long and 7 mm. wide; umbel globular, about 10 cm. wide; bracts lanceolate, broken into pieces 4 mm. long; flowers pedicellate, the pedicel about 2 cm. long; segments of the perigonium linear, 3-nerved, about 11 mm. long and 1 mm. wide; filaments filiform, about 15 mm. long, accrescent; anthers about 1.5 mm. long.

Haemanthus seretii De Wild., in Ann. Mus. Congo ser. 5 (3): 173. 1910. Leaves distichous about 6, the blade short, cuspidate, oblong, about 30 cm. long and 12 cm. wide, the lateral nerves about 12, the transverse nerves oblique; scape red-spotted, about 27 cm. long and 2 cm. wide; umbel many-flowered, 12—15 cm. wide, subglobose; bracts lanceolate, broken into pieces more than 6 cm. long; flowers pedicellate, the pedicel with the ovary 30—35 mm. long; segments of the perigonium subacute 1-nerved, narrow, 21—25 mm. long, about 0.5 mm. wide, velvety at the apex; filaments red, 22—28 mm. long; anthers about 2 mm. long.

Paramongaia Velarde, in Lilloa 17: 489. 1949. Related to *Pamianthe* Stapf, but distinguished because the free portion of the filaments has its origin below the mouth of the staminal corona and mostly because the tube of the perigonium has the same thickness throughout its length and the style is completely free without sheet-like expansions. But in *Pamianthe* the tube of the perigonium has extremely thick walls in its lower portion while the cavity diminishes into the very narrow canal located in the middle. Moreover, the style possesses on its lower portion 3 sheet-like expansions by which it is united to the sides of the perigonial tube. From *Leptochiton* Sealy and *Hymenocallis* Salisb. it is distinguished especially because these have seeds which are of the same form as in *Pamianthe*, manifestly flat and winged.

Sprekelia spectabilis Hoehne, Arquiv. Bot. S. Paulo, vol. 1. fasc. 1. 1938, pp. 23—24. Growing in level fields, with the bulb entirely immersed in the wet soil; bulb tunicated, the coats diaphanous, becoming almost purplish, attenuate toward the apex, almost obpyriform, usually 5—12 cm. long and 6—8 cm. thick; leaves 3—6, distichous, lorate-linear, rather obtuse at the apex, imbricate below, flat, 30—60 cm. long and 2—4 cm. wide; scape erect, cylindric, very slightly compressed below, glabrous and green, rather terete above and becoming more or less pur-

plish, 40—60 cm. tall, the apex hidden by the binary spathe and many linear-lanceolate membranous bracts, 4—8-flowered; spathe 2-parted, membranous, triangular-lanceolate, 5—7 cm. long; bracts linear-lanceolate, acuminate, as long as the pedicel; pedicels rather terete, 3—4 cm. long; ovary trigonous, glabrous, 1 cm. long, the lobes rounded; ovules many in each cell; perigonium intensely purple-blood red, conspicuously greenish and fleshy below, 1 cm. long, tubularly connate, finally thickened and bearing a membranous lacerated corona at the throat among the filaments; tepals lanceolate, acuminate, conspicuously divaricate, more or less twisted, *the upper one* greatly recurved, 9—11 cm. long and 1.3 cm. wide at the middle, *the lower ones* convolute between the bases of the petals and enfolding the staminal filaments, arcuately incurved and almost falcate above; petals dimorphous, the lateral ones larger, slightly shorter and narrower than the dorsal sepal, the lowest considerably shorter and much narrower, somewhat distinct beneath the stamens; stamens 6, extending downwardly at the apex; filaments purple-blood red, quite a bit longer than the sepals; anthers linear-oblong, versatile, becoming purplish, 6 mm. long; pistil long-exserted; stigma deeply 3-parted, the lobes almost clavate, papillose on the inner face; fruit not seen. Material examined: Herb. Servico de Botânica e Agronomia São Paulo no. 36534, collected by F. C. Hoehne and A Gehrt at Fazenda da Guanabara, Ilha Sêca, São Paulo, Brazil, half way to the boundary of southern Mattogrosso, collected in the living state in August, 1936, and blooming on October 21 of the same year in the Jardim Botanico at São Paulo.

Haemanthus faximperi Cufod., Acad. D'Ital. 1939, p. 326. Bulb ovoid, about 5 cm. thick; leaves 5—8, all basal or slightly superposed, the lowest ones almost reduced to the sheath, erect, obovate-lanceolate, gradually attenuate and sheathing toward the base, rounded or almost emarginate at the apex and protracted into a very small, obtuse, deltoid acumen, thin, glabrous, with 20—24 nerves which are more densely crowded toward the margins and joined together by many branchings, about 30 cm. long, 8 cm. wide above the middle; flowering scape growing out of the leaves, 1.5 cm. thick and 30 cm. tall, glabrous, naked, or with one or two lanceolate-acuminate bracts on the upper part which are 3—5 (rarely to 10) cm. long; inflorescence many-flowered, very dense, to 10 cm. in diameter; bracts many, green, erect, obtuse, 4—6 cm. long, forming an involucre; pedicels to 2 cm. long; tube of the perigonium 2 cm. long, 2—3 mm. in diameter, the segments linear, erect, 2 cm. long, 1.5—2 mm. wide, obtuse at the apex; filaments of the stamens inserted at the throat, to 2.2 cm. long, slightly surpassing the segments; anthers oblong, 4 mm. long, scarcely 2 mm. wide; style filiform, surpassing all the segments; all the parts of the flower, except the yellow anthers, intensely red-orange; fruit scarcely elongate on the pedicel, baccate, pea-shaped, red. In grass wet pastures in neighborhood of wells, 1600 m. altitude, April 8, 1937, Arero (Meta Gafersa), no. 278.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 146.]

3. GENETICS AND BREEDING

FRAGRANT **ALSTROEMERIA** HYBRIDS

MULFORD B. FOSTER, *Florida*

After seven years of hybridizing alstroemerias I feel like the field naturalist who is always chasing butterflies but never stops to classify or mount any of his specimens.

I hardly know where to begin to enumerate the beautiful hybrids. The first one produced, *A. caryophyllaea* x *A. pulchella* L. f., was pictured and described in Plate 13, page 84, HERBERTIA EDITION, PLANT LIFE, vol. 6. 1950. In the present issue Dr. Traub has named it *xAlstroemeria racinae*, for my wife, Mrs. Racine Foster. The cover design of the present issue is based on *xAlstroemeria racinae*. *A. caryophyllaea* has been crossed with *A. inodora* and its variety, *nemorosa*, and also with an unnamed species which I found in Bahia in 1948.

One most pleasing and interesting feature about all these hybrids is that they have, without exception, some of the delightful perfume of *A. caryophyllaea* which is the only species I know of with a really delightful fragrance. This fragrance lasts for days after the flowers are cut, even until the last petal falls. [See Figure 135, page 45, HERBERTIA, Vol. 12. 1945.]

When Jacquin described *A. caryophyllaea* nearly a century and a half ago he gave it its species name because it reminded him of the carnation, *Dianthus caryophyllus* Lem. Linnaeus had previously named the clove tree *Carryophyllus aromaticus* because of its strong perfume.

Someday I feel certain that the lovely scented, cool night air of a Florida garden will make the alstroemerias as famous in poem and prose as do the odors from the ubiquitous orange, the tantalizing jasmine or the savory tea-olive blossoms.

My prophecy is that it will take several years before these lovely flowers become popular, if for no other reason than their name. It is a bit difficult to pronounce and remember by most people. Violet, rose, pink or orchid attached to its name would have insured immediate and widespread recognition. [EDITORIAL NOTE.—The popular name, PERUVIAN LILIES, for alstroemerias has been suggested and is coming into use.]

The color range is endless. The key of color is inclined to stay in the middle octaves. Their color notes are not pitched as high as they are in the Pacific Coast alstroemerias from Chile and Peru where they are inclined to be rather of the clear, red, yellow, pink, white or orange

tones. Brazilian alstroemerias carry a much more subtle range that is equalled by few plant groups.

With the introduction of the blood of *A. inodora* and its variety *nemorosa* we have increased the color range; we now find old-rose and lavender showing in some of the crosses, and while we would be perfectly thrilled to have some clear blue blood to work with, we can hardly expect it for none of our efforts to cross these Eastern species with the Western species have been successful.

Certainly there are few tropical perennials as easily cared for as these sweet scented hybrid alstroemerias. While they have thickened tubers on their roots they do not have to be dug and replanted each year. They ask for acid, well drained soil and a shady location. They are evergreen, transplant easily and do most of their flowering throughout the spring and early summer months and many of them carry on until their maternal parent *A. caryophyllaca* starts to flower in December through to March.

My new find from the 1948 collection in Bahia, Brasil is an alstroemeria that has a lovely drooping yellow and salmon colored flower. However, it is smaller and is not so "perk" as our *A. caryophyllaca* species is. The crossing with *caryophyllaca* does help it but we have yet to see just how much benefit we can obtain with its use. The plant is not too strong nor erect; the foliage is not as lovely. In contrast, the foliage of *A. caryophyllaca*, *A. pulchella* L. f., and *A. inodora* var. *nemorosa* is a real asset to the scented hybrids for their use as cut flowers. The leaves are nice for cutting, hold up well and add a decorative note with their green pin-wheel-like whirl of resupinate leaves.

In another year or so I hope to have some of the nicer selections ready for distribution.

xHEMEROCALLIS — GLADWYNE CHIMERA

Mrs. Mary G. Henry, *Pennsylvania*

Just two years ago in the 1950 Herbertia, I told the story of a new *xHemerocallis* clone which I am calling Gladwyne Chimera.

I had tied a tag on the flower stalk that achieved the extraordinary feat of producing both red and yellow flowers on the same stalk in the summer of 1949. Unfortunately someone removed the tag. I was away from home the following autumn on a field trip and again on another trip the next spring, so it was not till early summer 1950 that I found time to divide the interesting new *xHemerocallis* clone.

I cut the clump with considerable trepidation, into six sections and replanted them carefully. The little "Trial Garden" was so overcrowded that I had to set out the 6 divisions in a row outside of the fence and I just hoped they would not be run over by the boy with the lawn mower

xHemerocallis—GLADWYNE CHIMERA: view showing whole plant: two flowers all red, and two flowers all yellow. Photo by Mrs. Mary G. Henry.

Plate 9

or have their tops chewed off by itinerant rabbits. That year only a few of the recently planted divisions bloomed and their stalks bore only red flowers. I did notice a few very small yellow streaks in some of the flowers, but these were inconspicuous and certainly added nothing to their appearance; in fact they detracted from their beauty, because they almost looked as though they were caused by an injury to the bud or else the result of an attack by thrips.

This spring, 1951, I left home in May in order to give a lecture in Montana. I added a collecting trip on to the lecture and had a thrilling time in the Bitterroot Mts., Mont., the Big Horn Mts., Wyo., and the Black Hills, S. D.

When I arrived home July 15. I was so utterly absorbed in preparing a place for, and planting rare *Penstemon*, *Phlox*, etc., that I completely forgot the *xHemerocallis*.

Then one evening after dinner, about 10 days later on, I slipped down to the "Trial Garden" to see if the seedling Azaleas needed any attention. Through the picket fence my wandering eyes caught a glint of yellow. Then I remembered the precious *xHemerocallis*.

There, as though a greeting, was one of the beautiful pure golden yellow blooms, more beautiful it seemed than ever. Evidently the division that had the yellow coloring did not bloom in 1950.

The two years' wait was forgotten.

It was about July 25th and although many blooms had come and faded, there were still many unopened buds. Early next morning, before breakfast, I tore down to the "Trial Garden," in keen anticipation of what I might find. No disappointment was in store for me. There were two gorgeous yellow blooms expanded, one on each of the two stalks and only one red one.

My camera records the story on the mornings that followed. Occasionally there would be a flower partially yellow but usually the metamorphosis was a complete one. Sometimes there would be two yellow flowers and one red and sometimes there were two red and one yellow. Several times there were two of each color in bloom simultaneously. [See Plates 9 and 10.]

It was such fun each morning to see what the day would bring forth. The blooming season ended about August 10th.

The nice part about all this is that the flowers are a fair size and the shape is good. The ruffling along the edges of the tepals adds to the decorative quality of the plant.

I would be ungrateful if I did not admit that my lucky star that has brought me so many beautiful and unusual plants is still shining brightly.

xHemerocallis—GLADWYNE CHIMERA; (See opposite page.) (upper left) two all red flowers; and two yellow and red flowers; (upper right) one all yellow flower, and one yellow and red flower; (lower left) one yellow and red flower; and (lower right) one all red, and one all yellow flower. Photo by Mrs. Mary G. Henry.

Plate 10.

PROGRESS IN DAYLILY BREEDING

W. R. Ballard, *Maryland*

Anyone undertaking a breeding project with plants soon comes up against the problem of space, since the chances of securing an outstanding new variety are greatly enhanced by growing large numbers of seedlings. With experience in this field the proportion of promising seedlings can be increased. Knowledge of strains with good potentialities can be discovered, and efforts, based upon these discoveries, speed up progress. In the last two or three years, I have adopted a plan suggested by Dr. Hamilton P. Traub [Herbertia 1940, pages 152, 154.] designed to increase the prospect of variation in the resulting seedlings. This consists in the use of mixed pollen. With this method one can secure in one seed-pod many more combinations of characters than is possible by using pollen from a single individual. I have tried to use pollen from yellows on yellow, reds on red, pinks on pink, and bicolors on bicolor. It will be another year or two before the results of this method in the present case can be ascertained but it seems to have intriguing possibilities.

When beginning the breeding of daylilies I had no very well defined goal in mind except to get something different. I have at last concluded to concentrate on the late bloomers, since this group has not reached the development attained by the earlier groups. I do not plan, however, to give up entirely working with the other groups. One can secure interesting specimens for one's own garden even if they are not of sufficient merit for introduction to the public. One June bloomer has been striking enough to attract the attention of visitors to my garden. This has been named Bizarre. It is a yellow "eyed" variety with the red color above the middle and on *all* segments which are over 4 inches in length. The plant grows about 2 feet high.

During the 1951 season I had a block of between 15,000 and 16,000 seedlings in bloom and some 200 or more selections were made before discarding the remainder. These will be made the basis of further crosses with each other and with standard named varieties. Expert daylily judges have indicated several in the late blooming group which merit naming and introduction. These will be further tested before distribution. These late blooming seedlings seem to hold considerable promise as breeding material for future improvement. Some progress has been made to increase the size of the flowers. Since the *H. multiflora* species which forms the basis for this project has flowers of only medium size, an attempt has been made to hold in storage pollen from the large flowering midseason bloomers for use on the late flowering sorts. It will no doubt take several generations to reach results comparable to what has been accomplished with the main season varieties, but the results to date have been encouraging.

One character has been studiously avoided in my work with the daylily and this is the spreading propensity of the EUROPA and similar types. For garden use this wandering tendency is a serious drawback. Fortunately most of the modern varieties "stay put" and this is certainly an ideal toward which all daylily breeders should strive.

xCRINODONNA CORSII CLONE DOROTHY HANNIBAL

L. S. HANNIBAL, *California*

This hybrid, *xCrinodonna corsii clone* DOROTHY HANNIBAL [described elsewhere in this issue] is one of several colorful seedlings resulting from the crossing of *Brunsvigia rosea* var. *rubra* with a *Crinum moorei* during the fall of 1941. The seed parent—*Brunsvigia rosea* var. *rubra*—is commonly called "variety *minor*" in California gardens. It differs from the better known "major" by its narrower foliage and late-flowering, near coral red, blossoms.

The *Crinum moorei* pollen parent would be hard to identify due to the variability that exists in this species. However, the clone was of a relatively small semi-summer-dormant bulb type that produces a small scape with nicely formed white blossoms. The *xCrinodonna* (syn.—*xAmarcrinum*) hybrid under discussion was the first of several score that have been hybridized. However, it is the hardiest of all to both drought and extreme frost.

The seed types that resulted from this initial cross will long be remembered as they were of two distinct forms. The most prevalent seeds in the pods of "rubra" were the relatively small coral red fleshy type so typical of *Brunsvigia rosea*. These, as often verified in subsequent crosses, were strictly parthenogenetic, but some 12 or 15 large opalescent green seeds were found in the pods of several scapes. These, which were relatively distinct from any known *Brunsvigia rosea* seeds, were about 10 or 12 mm., in diameter, and were germinating in the pod. Such behavior is typically *Crinum* and in habit *xCrinodonna* completely resembles a *Crinum*.

The bulbs of the clone DOROTHY HANNIBAL are seldom more than 2 inches in diameter which makes the hybrid a good pot plant. If freely watered the plant is practically evergreen and multiplies rapidly. It flowers with two scapes in the very late fall the blossoms being very fragrant and of a deep rose color. Unlike the much larger hybrid of Fred Howard, *xCrinodonna corsii* clone FRED HOWARD, this plant does not seem to attract the garden snails so readily, but mealybugs seem to be persistent pests.

Subsequent crossings have shown that only a few *Brunsvigia rosea* clones respond to *Crinum moorei* pollen. *Brunsvigia rosea* var. *major*,

which is the seed parent of Mr. Howard's well known hybrid will take *Crinum moorei* pollen occasionally. The pollen of "*rubra*" is more responsive. The variety *pallida*, the pale pink form crosses reluctantly, and clone FRANK LEACH has never produced a single hybrid seed.

The Australian *Brunsvigia multiflora alba* hybrids are equally unresponsive to *Crinum moorei*, and strangely enough do not produce many apogamic seeds either. In contrast to the behavior of *Brunsvigia rosea* several of the *C. moorei* clones and a half score of *Crinum* hybrids or related *Crinum* species have pollen nearly as potent as *C. moorei*, and when used on responsive *Brunsvigia rosea* clones will readily cross. However, in several instances difficulties were encountered with the hybrid seeds due to splitting by overly rapid growth. The reverse cross of *Brunsvigia rosea* pollen on a *Crinum* has never taken. It is quite probable that the stigma of the *Crinum* is much too long to permit *Brunsvigia rosea* pollen tubes to grow down to the ovary.

All in all, the clones of *xCrinodonna* are interesting hybrids since two distinct genera are involved with different growth habits and periodicities. That the *Crinum* dominates the cross so completely suggests that the respective chromosomes are not individually compatible. This is further borne out by the sterile habits of the hybrid, as it neither selfs or back crosess on either parent. Otto Staph commented in a similar vein (Curt. Bot. Mag. t. 9162) when he discussed the *Crinum—Brunsvigia rosea* relationship. However, this hybrid behavior merely indicates a common ancestry, like the *C. moorei* x *C. asiaticum* cross.

Reference: HERBERTIA, vol. 10, page 69. 1943.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 35.]

in its pale-rose perianth being purple on the lower third (completely rose-red in *robusta*), the peduncle being rather thick, the spathe tubular up to the middle, the pedicel shorter than the spathe, the stamens scarcely reaching the middle of the limb. . . .

Eustephiopsis speciosa R. E. Fries, op. cit. 163. 1905.—Leaves narrowly linear, smooth at the margin; scape slender, about 2-flowered; bracts longer than the peduncle; segments of the infundibular corolla oblong or obovate, whitish-rose within, whitish and crimson-veined outside; teeth of the filaments slightly spreading, acute; anthers slightly exserted. Argentina.

Eustephiopsis latifolia R. E. Fries, op. cit. 164. 1905.—Leaves broadly linear, obtuse, white-margined, the margin scabrous; scape elevated, strong, longer than the leaves; inflorescence many-flowered, pseudo-umbellate; two exterior bracts narrow-lanceolate, the interior ones linear, all shorter than or subequaling the peduncle; segments of the tubular-infundibular corolla oblanceolate, red outside, yellowish within; teeth of the filaments rather obtuse, incurved; anthers and the

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 183.]

4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

ADVANCES IN ALSTROEMERIA CULTURE

HARRY L. STINSON, *Washington*
Northwest Regional Vice-President

The Alstroemerias are slowly becoming better known and appreciated by the more alert and progressive horticulturists. Their ease of culture, freedom from pests and disease, and the long keeping qualities of the flowers at once make them favorites with those who grow them. More and more I receive inquiries from those who have seen them growing in some garden and wish to have a more intimate acquaintance with them. This past August I dug so many tubers that I thought that I never would be able to dispose of them all, but at this writing I am beginning to see the bottom of the barrel. In another couple of weeks it will be time to put them back into the ground for another cycle. With the coming of our rainy and damp season they start to show evidence of wanting to grow, and if not planted soon, they become a mass of tubers and rootlets difficult to separate.

The last two winters have been rather rugged. Ordinarily the hardy alstroemerias will survive light freezing. The tops will be frozen but they soon recover. However, this past winter we had a late freeze, without a protective covering of snow, which froze down to the tubers and killed out quite a large bed. A heavy mulch would have prevented this damage. Several growers in the North Atlantic States are successfully growing them by deep planting and heavy mulching during the severest part of the winter. Having overcome this problem the next one is to be able to keep the ground cool during hot summer days. Experience has shown that they do not like a soil that gets too dry and hot.

Digging the tubers for the trade is a tedious task and I have my doubts if a mechanical digger can be perfected to do the job satisfactorily. The tubers do not grow uniformly downward but in all directions of the compass, and while they are turgid they are extremely brittle. The slightest movement of the soil causes them to break, and they are more or less ruined for market. This past season I was digging eighteen inches deep and even at that depth I was constantly cutting off the ends of the tubers to such an extent that I doubt if they will recover. These mutilated tubers I saved separately and will plant to study the effect of such damage. I have discovered that when the tubers are planted

they immediately make root growth from the terminal ends of the tubers. Now, with the ends gone or damaged, will they send out more lateral rootlets to compensate for the loss of the terminal ones. Simultaneously with the root growth a new crown is formed adjacent to the old one or at the end of a stem-like structure which grows outward and downward to a length of two to four inches. Here the new crown is formed with a whole set of bigger and longer tubers. At the end of the season, the old set is completely absorbed and exhausted, just like an old potato. In the case of some species, year by year the tubers go deeper and deeper into the ground. I find that the tubers even penetrate down into the hard clay hardpan. This *story* was related to me by a good Garden Club Lady, and you well know that such ladies are not given to gross exaggeration. Like most Garden Club members they are always willing to share the good things of their gardens with fellow members. So when her friend asked for a start of the alstroemerias she readily consented to dig for her a few tubers. She was as good as her word and started to dig. She dug and dug and was half way across the street before she realized it, and still no tubers for her efforts. That possibly explains why they should be planted where they are to remain undisturbed for years to come. In digging them year after year I have noticed that the *A. ligtu* and *A. chilensis* and their hybrids do not have a tendency to spread by means of their tubers, which sink lower and deeper into the soil. On the other hand the tuberous system of *A. aurauntiaca* [Fig. 13] and its relatives are more stoloniferous and do usurp the adjacent soil.

Notwithstanding their good keeping qualities as cut flowers the Florists' fraternity is still reluctant to use them extensively. It takes time and money to educate the general flower buying public. People are not inclined to buy those things which are not extensively advertised.

The two most outstanding events in the *Alstroemeria* world during the past decade were (a) Foster's re-discovery of the only known fragrant *Alstroemeria* species, *A. caryophyllaea*, [see Fig. 135, page 45. HERBERTIA, vol. 12. 1945], and (b) Goodspeed's re-discovery of Feuillée's *A. ligtu*, [see Fig. 136, page 49, HERBERTIA, vol. 12. 1945].

As to *A. caryophyllaea*, it is my understanding that it is very prolific under Florida conditions, and Mr. Foster has developed some very promising hybrids. Under my conditions here in the Northwest I have not been successful with them. Primarily I think due to insufficient warmth.

This species was originally brought to the attention of Linnaeus, junior, who classified it incorrectly as *A. ligtu*. Later, about 1774(?), when Jacquin made an inventory of the plants in the Schoenbrunn Gardens, he wrote that he remembered it as having grown there about thirty years before but that it soon perished. He named it *A. caryophyllaea* because of its carnation fragrance. For a more complete account of this most beautiful flower consult the 1945 edition of HERBERTIA [pages 44 to 48, fig. 135].

Alstroemeria ligtu. Confusion in plant nomenclature is about as hard to live down as a bad reputation. Confusion about the *A. ligtu of*

Father Feuillée dates back to the time of Linnaeus. Feuillée wrote that he found it growing on the banks of the river which flows through the City of Conception (Chile). There is no record of his having sent back tubers of it to France. Probably not, for it was still in bloom. He further states that he did not see the seeds as he had to leave before it was mature. Between the time when Feuillée found it, and the time of Linnaeus' Species Plantarum (1762) was published, another plant had been introduced into European gardens. This newcomer, Linnaeus im-

Fig. 13. *Alstroemeria aurantiaca*, the very beautiful species commonly grown in California. Photo L. S. Hannibal (Fig. 82, HERBERTIA, 1942.)

mediately perceived, did not coincide with Feuillée's description of *A. ligtu*. So much so that he wrote that Feuillée's description was so barbaric and poorly done that it was impossible to make it fit. From that time to the present day that plant has been parading as *A. ligtu* and its hybrids.

Since 1934, I have been collecting *Alstroemeria* seeds and tubers from all possible world wide sources in the hope of eventually finding a plant that would fulfill Feuillée's description. Out of thousands of plants scrutinized under cultivation under glass, only one plant (Plate

(Upper) One of Harry L. Stinson's fields of *Alstroemeria chilensis* in flower; (lower) Alstroemerias cut and placed in deep water before packing and shipping to the San Francisco World's Fair. Harry L. Stinson photo (plate 236, HERBERTIA, 1942).

Plate 11

(Upper left) Feuillée's *Alstroemeria ligtu;* (upper right) form in Stinson collection somewhat resembling *A. ligtu* (Feuillée's type); (lower left) a form in the trade as "A. ligtu," but may be *A. haemantha;* note leaves; (lower right) the beautiful pink form of *A. chilensis.* Photos by Harry L. Stinson (plate 226 HERBERTIA, 1942).

Plate 12

Alstroemerias naturalized at the University of California Botanic Gardens, Berkeley, Calif. Photo by L. S. Hannibal (plate 235, Hesperia, 1942).

Plate 13

12, upper left) ever gave any evidence that there might be a true *A. ligtu*. It was evidently a hybrid with some *A. ligtu* genes since it showed characteristics of both *A. ligtu* and *A. chilensis*.

By a stroke of good fortune seeds, derived from *Alstroemeria* plants collected by Dr. T. Harper Goodspeed of the University of California, during his Plant Hunting Expedition along the Andes (see Plate 13), came into my hands which proved that Feuillée was correct. Plants from these seeds definitely fitted his description of *A. ligtu* [see Fig. 136, page 49, HERBERTIA, vol. 12. 1945]. Nowhere in his description does he mention that there are cilia along the leaf margins. They are so evident on the species which we had been cultivating under the name of *ligtu* hybrids that Feuillée could not possibly have overlooked them if they had been present on his plant which he named Ligtu, after the flour meal made from the starch in the tubers. Neither do the Spanish botanists, Ruiz and Pavon, mention anything about the leaves having cilia. They write that this plant grows here and there in sandy places about the City of Conception (Chile) and abundantly in the adjacent Province of "Rere"—at that time a province immediately east or south of Conception and not given on modern maps. I am thoroughly convinced that Charles H. Curtis would find cilia on all the "A. Ligtu Hybrids" he so admirably describes in the March, 1951 issue of "Gardening Illustrated." Feuillée stated that his plant had *white* on the two upper petals. And it does. Further, Mr. Curtis writes that his hybrids of *A. ligtu* ? were marked with gold (yellow) and red on the two upper innermost petals.

The seeds of the true, *A. ligtu* are about one third the size of those of the *A. chilensis*. The stems are not as tall as the latter and have smaller umbels of flowers. Usually four to six peduncles with two, seldom three, pedicels. The flowers a clear crimson *with white on the two upper innermost petals*, with red markings. The tubers are much more uniform in size and shape than *A. chilensis*, usually about six tubers half an inch in diameter and four inches long. For several years I have noticed plants with tubers rather short and stubby, which I believe to be a characteristic inherited from the hybridizing of the *A. chilensis* with *A. ligtu*.

Experience has definitely proven to me that we now have the true *A. ligtu* of Father Feuillée, and that all that we had formerly been growing under the name of "*A. ligtu* and its Hybrids" are in reality *A. chilensis* and its various hybrids. Whether my viewpoint will be generally acceptable, only time will tell.

A. violacea [see Plate 170, page 23, HERBERTIA, vol. 7. 1940] is proving to be a favorite with all who see it. Its soft lilac-mauve is exceedingly pleasing, both as a specimen plant and for arranging. It does well in a cool humid house or well sheltered location free from all frosts.

The years of the past decade have been pleasant ones, horticulturally speaking, looking forward each season to the riot of color afforded by a field of Peruvian and Chilean lilies from the Andes [Plate 11]. It is my sincerest wish that the next decade will be as pleasureful to all those who indulge in the culture of the Alstroemerias.

ALSTROEMERIAS IN THE REGION OF ANGOL, CHILE

DILLMAN S. BULLOCK, *Chile*

Some of the very characteristic summer flowers of this part of Chile are the different species of *Alstroemeria* or as they are called here "Liuto." (Pronounced lēutō, u as in use.) "Liuto" is the indian name. The designation "Ligtu" is apparently a corruption of the indian name. It may be the name used by the indians of some other region.

They begin flowering fairly early in the spring, generally in October and continue until late in April. The period of flowering naturally depends somewhat on the season as well as the latitude and altitude.

The different species vary greatly in their time of flowering as well as in the length of time when flowers may be found. Our commonest species is probably *Alstroemeria aurantiaca*, the common yellow one. Under cultivation this species, in favored localities and with no special care, flowers to a limited extent almost every month of the year. In fields sown to wheat for the first time on recently cleared land it is a common sight to see the golden flowers mingled with the ripened grain at the harvest.

In this region we have at least six very distinct colors of flowers. Each species has its favorite environment where it is normally found and where it reaches its maximum natural development. Only occasionally are two species with different colors found flowering together. Frequently they may be found growing together but flowering at different periods.

There is also a very great difference in the height of the different species. The common yellow one normally grows from two to three feet high and in the grain fields is practically the same height as the grain. In the open fields on stony, uncultivated spots, one common species grows only about ten inches or a foot high.

The altitude variation of the different species is also very marked. The valley of Angol is only about 200 feet above sea level and four species are commonly found in the valley and surrounding hills up to perhaps 500 feet or a little higher. Another species flourishes in the coast range at 1500 to 2000 feet more or less. Possibly it has a wider distribution than this but the writer has observed it as abundant only at these elevations. Still another species is very common in the Nahuelbuta range of the coast high up among the Araucaria forests at around 4000 feet. These flower in the months of January and February.

In those localities where the Alstroemerias are naturally common they generally disappear as soon as the land is brought under regular cultivation. Along fence-rows, in rocky stony ground that cannot be cultivated and where they are protected from grazing, in certain years they may remain almost permanently. In some places along the railroad

right of way they seem to flourish exceptionally well. On the coast range in cutover land where the heavy timber has been removed and there is considerable second growth and brush, one almost orange species flowers abundantly in the months of February and March.

The Alstroemerias grow in a great variety of soils. In this part of Chile there is considerable rolling hilly land used principally for the growing of small grains and some grazing. In the late summer this land is almost entirely devoid of anything green. On these hills one pale-colored species, almost as spotted as a tiger lily, flourishes making use of the winter rains by flowering fairly early in the spring. It grows mostly besides the stones or on land so rocky that it cannot be cultivated. The soil is mostly heavy clay. Transferred to a rich well cultivated soil they all naturally grow better and larger. Under normal wild conditions I believe the soil is always acid where the Alstroemerias grow.

Naturally they all seed abundantly but not always. With some species there is no difficulty in collecting seeds every year but with others it is much more difficult. One species, at least, is very severely attacked by the larva of a moth which lives inside the seed pods leaving them entirely empty. In an attempt to obtain seeds of this species the writer collected a large number of plants just as the seed was ripening. Seventy-one per cent of the pods were attacked and entirely without seed. Several others had been attacked and had one or two seeds each. This natural enemy may account for the fact that species in some localities tend to die out and disappear without any apparent cause.

One practical use made of the different species is in the making of "Chuño." The "Chuño de Concepción" is quite famous. It is a kind of starch made principally from the enlarged roots of *A. ligtu* which grows very commonly in the region of Concepción. The common method of making the chuño is more or less as follows. After gathering a sufficient quantity of the roots they are carefully washed until *all* of the dirt is removed. When thoroughly cleaned they are placed in warm water for a short time to remove the bitter taste of the roots. They are then ground up and placed in cold water. After thoroughly mixing them with the water they are strained through a fine sieve to take out all the fiber. The starch is allowed to settle and later is thoroughly dried. This "chuño" is used principally as food for small children and persons suffering from digestive troubles.

Strange as it may seem, almost no one grows Alstroemerias in this part of Chile. Being a native plant it is rather looked down on by the Chileans themselves. It is the general feeling that things imported are much better than the native articles so why bother with them. This attitude accounts for the fact that many Chilean plans grown extensively as ornamentals in other countries are grown scarcely at all in Chile.

A TRY AT ALSTROEMERIAS

W. R. Ballard, *Maryland*

I saw my first alstroemerias several years ago while visiting the U. S. Plant Introduction Gardens at Bell Station in the vicinity of Washington, D. C. I was impressed by the beauty of the flowers but it was not until the fall of 1948 that I ventured to try these interesting plants in my own garden. At that time I planted *Alstroemeria aurantiaca*, *A. hookeri*, *A. ligtu*, and *A. pulchella*. Of these only *A. aurantiaca* thrived and these have now bloomed for three seasons. In the summer of 1950 seeds were saved from these and were planted in a pit used for carrying plants over winter. The seeds germinated well the following spring and grew so well that the plants were transferred to the garden late in the summer.

In the fall of 1950 Dr. H. P. Traub was good enough to give me a plant of *A. pulchella* Linn. f. Plants of *A. chiliensis*, *A. pulchra*, *A. ligtu angustifolia*, and *A. ligtu* (true of Father Feuillée) were purchased. *A. chiliensis* grew well and flowered in 1951 but the others made weak growth and did not flower. This past fall plants of *A. caryophyllaea* were ordered and the blooming of this fragrant type will be looked forward to with eager anticipation.

I made one serious mistake this past season. The flowering stems of *A. aurantiaca* and *A. chiliensis* were supported by wire stakes 18" high. However, during early summer we had heavy rains and these alstroemerias grew three feet high and the stems were broken over by the heavy downpours. The crooked stems spoiled them for cutting but the flowers were as beautiful as ever. As noted by other writers the flowers have unusually good keeping qualities.

This fall some plants have been set in the open where they will get more sun than those previously grown and it will be interesting to see whether or not this will tend to restrict the height of the flowering stems.

ALSTROEMERIAS IN PENNSYLVANIA

John F. Ruckman, *Pennsylvania*

In 1941 some six or seven varieties of *Alstroemeria* were sent to me from California for trial. There they had bloomed during the winter and arrived here late in April just as they were entering their dormant state. Though they were set out immediately, and every effort was made to encourage growth, they remained determinedly dormant all summer.

starting into growth just in time to be frozen back in the fall. A few of them survived the winter in a weakened condition but of the lot only *Alstroemeria aurantiaca major* was able to adjust itself to the point of blooming, and eventually becoming aclimated and established. It would seem that the only satisfactory way of starting Alstroemerias in the North is from seeds or with roots raised in a very similar climate.

I still have *A. aurantiaca* in several color phases, *A. aurantiaca major* and *A. pulchella* Linn. f. (syn.—*A. psittacina*) growing lushly in large mixed patches. All spread prolifically by rhizomes and to a lesser extent by self sown seeds. All bloom freely in June and July and intermittently until the first hard freeze. Pulchella is in bloom at present (October 22). Their only enemies seem to be poor drainage and occasionally field mice.

I understand that Mr. Rex D. Pearce grows *A. pelegrina* and possibly one or two others successfully at Merchantville, New Jersey. While only about thirty miles south east of Doylestown, where I am located, Merchantville is much nearer sea level and much nearer to the sea coast —consequently the winters are considerably milder there than they are here. I had intended to get plants from him to try here but so far have not done so.

ALSTROEMERIA VIOLACEA IN SOUTHERN CALIFORNIA

E. O. Orpet, *California*

We received 300 *Alstroemeria violacea* seeds from Dr. Goodspeed's expedition to Chile through the U.S.D.A., and although it was stated that the usual method of procedure required a year for their germination, we found that by soaking them until the white germinal spots showed on the seeds, they germinated almost at once and bore enough flowers in the first year so that we could at least see the color. Out of 300 seeds we got 350 plants, owing to the double embryos in some of the seeds. We sowed them in April. There seems to be no better way to propagate *Alstroemeria violacea* than by sowing seeds. The tubers cannot be transplanted until they are at least a year old and dormant, and even then they do not seem to take kindly to being moved. But there is no trouble at all with seed propagation.

The reader is referred to Herbertia, Vol. 7. 1940, page 23, Plate 170, for a good illustration of *Alstroemeria violacea*.

Alstroemeria violacea grows freely here at Santa Barbara, California, and reaches a height of about three feet when the roots are well established. Seeds are produced as freely on them as with any of the other species. We tried one hybridization experiment. There was a large clump of *A. pelegrina alba* growing next to the stand of *A. violacea*, and

Hybrid *Amaryllis* as grown by E. A. Wadewitz (center), of West Palm Beach Rd., Reswick, Adelaide, S. A.

Plate 14

we pollinated the *alba* on the *violacea* and vice versa, marking the pods, collecting them later, and sowing them. This was at least four years ago and we have kept that patch of seedlings separate. So far the flowers produced seem to be the typical *A. pelegrina*. The flowers are striking in size, and are hardy, but we are sure that anyone who is familiar with Alstroemerias would designate them as *A. pelegrina*.

Alstroemeria violacea is a true violet in color, according to the Ridgway Color Chart. It varies very little from opening to closing, although fresh stamens are bright blue, and that color goes off as the flower matures. They are hardy to our winters here, but they do not like wet feet and with prolonged and heavy winter rains they do suffer. They do best in light friable soil in part shade and on a slope. The tall ones must be staked, and since their stems are not so woody and long as other varieties, it is well to protect them from winds.

AMARYLLIS IN SOUTH AUSTRALIA

E. Douglas, *South Australia*

Here in Adelaide in the southern part of Australia, Hybrid *Amaryllis* are usually grown in the open all the year round. Sometimes winter frost kills the leaves, but around December, we usually have 80°—90° F., weather. Between December to January, we can be sure of one week when the temperature rises to 100° F., and more. Hot winds come from the north (prairie) west, a flat country, 1000 miles wide with very few trees.

Within a 100-mile radius of Adelaide, 80 per cent of all Australian wine is produced; also celery, averaging a yard high, is a big business, much being sent to Melbourne and Sydney. Early tomatoes are also grown under thousands of low glass houses. Adelaide is situated between a range of low mountains and a gulf which is twenty miles west. Very fertile land produces almost everything—vegetables, and flowers, and especially, roses extra well. In the hills camellias, azaleas and rhododendrons grow well, and also fruits of all kinds—apples are much exported to Europe.

Mr. Wadewitz grows thousands of hybrid *Amaryllis* as a hobby [Plate 14], and has given away pints of seeds to growers Ron Kemp, Both, Ted Smith, who are growers and exhibitors of hybrid *Amaryllis*. Some marvelous gladiolus blooms are produced, and forced for exhibition purposes. Some of the blossoms seem as large as the open hand compared with the blooms produced out of doors.

AMARYLLIS NOTES, 1950

HERMON BROWN, *Chairman*
Amaryllis Committee, Gilroy, Calif.

This year [1950] started out with a hard freeze that killed a great many of my larger bulbs in the fields. Added to this handicap, it has been an exceptionally dry year. Fortunately, I have a good well, and could irrigate my bulbs whenever necessary.

However, we had three very hot spells that burned the leaves of the amaryllis. My prune orchard suffered more than the bulbs. Some of the prunes were actually burned up on the trees. Thus the growth of the fruit, and the growth of the amaryllis was checked, and therefore I have a much smaller number of marketable bulbs of 2½ inch size.

The unfortunate circumstances were somewhat alleviated by some much more beautiful blooms in my greenhouse—a number of new colors, mostly in shades of red. Heretofore I had a great number of orange-reds in various shapes; now I am getting a few in the crimson shades. I call them the "Blue-Reds." Have been short of pinks, but this year I had some very lovely pinks, and also some very satisfactory pink and white blooms.

Each year I bring in some new stock from Holland. While these imported bulbs have the color, shape and substance, they lack the vitality that my home grown bulbs usually have.

So far November has given us no frost to check the growth of amaryllis bulbs—hence no bulbs dug as yet.

The weather being so very dry, I irrigated the first of this month [November]. Then came heavy rains, six inches last week, but everybody is happy, as our wells had been going down about ten feet a year for the past three years. I am now lifting water over one hundred feet. If we continue to get good rains during the winter, the gravel beds will fill again, but we must store and conserve water.

"How long will Amaryllis seeds live?" is a question I am often asked. I have a small greenhouse that I keep heated just enough to prevent the plants from freezing and have found that the twentieth of January is a good time for planting the seeds harvested in the previous May, June and July. Have had fair success in raising a few thousand plants each year. It was May 23rd when I planted this year. I had also some seeds left from the year before, which were nearly two years old. These I planted in a flat by themselves, and they germinated about the same as those of a year old.

PERSONAL EVALUATION OF SOME HYBRID AMARYLLIS CLONES*

ROBERT G. THORNBURGH, *Vice-Chairman*
Amaryllis Committee, Long Beach, Calif.

As far as amaryllids go, my first and foremost loves are the hybrid *Amaryllis* clones. The rest of them are of interest because they belong to the same plant family. I must admit that of these I am inordinately fond of the clivias. I am greatly intrigued by crinums but can't go overboard for all of them. I have tried to increase my collection of the last named with great help and encouragement from my wife, Edith. Many of the lesser kinds I have picked up as I went along out of mere curiosity. I have struggled along with vallotas, and got one of them to start a bloom, but it blasted. The other died back and I thought one of Edith's Narcissus flies paid it a call, but it is up again this month.

The following hybrid *Amaryllis* clones have been tested, and they are rated for performance.

DORIS LILLIAN (Ludwig). AA, this is outstanding. Looks magenta but is Tyrian Rose (RHS Color Chart), but at the time I had only the first volume which did not show the depth of rich color of the flower. It is 7 inches across, very clear deep pink, darkening in the throat with no green or other adulterant color; flat (Leopoldii) type bloom with even edges; no ruffles (Edith likes this kind). The petals do not recurve or lose any of the effect of a large flower, and thus gives the appearance of a larger bloom.

PINK PERFECTION (Ludwig). AA, 7½ inch. Same shape as above; Rose Madder (RHS 23/1) on edge and RHS 23 in the middle, and even darker in the center; Leopoldii flat stiff form. I do not mean that the bloom loses grace by "stiffness."

SWEET SEVENTEEN (Warmenhoven). 8 inch, salmon pink; rather light pastel with white stripes in center and white on back of petals. Edith likes this one. I also received from John Dix of Heemstede, Holland, two bulbs labeled "Rose." One of these is identical with SWEET SEVENTEEN, but the other is a clearer and better color. I did not grade these or the SWEET SEVENTEEN because I was prejudiced against the color. They would rate an A but on my list a B plus.

ROSELIND. (Ludwig). RHS Geranium Lake 20/2; small flower but a real pink, not salmon pink. At first I was annoyed that this was propagated but when I realized what a nice pink it was, rather delicate with much green in center, I liked it better. Somehow the green does not

*The reader is referred to HERBERTIA 1950 (in Vol. 6, PLANT LIFE, 1950) page 42, for a plate showing eight different flower types (shapes). Discussions on the readers' preferences for the various hybrid *Amaryllis* flower types is invited.—*Editor*.

detract from the whole effect. If you can put aside your prejudice against green, this is very pretty. Although it is small, it made up for that with 8 blossoms on two simultaneous stems, very showy and graceful. I did not grade this one since it is a novelty and either you like it or you don't.

Java (W. E. Rice). Petals not wide, yet neither narrow; Crimson RHS 21, with white center; a little green at base of petals. This year it bloomed only at 5 inches across, on a very small bulb, but two years ago had much larger blooms which I did not measure. I asked Mr. Rice why he chose this to name, and the reason was because he and his wife felt that the color resembled that of the American Beauty rose. I did not verify this since I had not seen that rose recently. I graded this one B on the basis of form, and also because I have much better flowers of identical design and color. It is a good flower but has been improved on since it was named.

Ludwig's Scarlett (Ludwig). AA, the best of the Ludwig reds that I have.

American Express (Ludwig). AA, very clear, brilliant flower, "medium red blending to deep red in throat." The bulb was not well rooted so the bloom was about 6½ inches. In the Cleveland trials it was graded AA, but I think that it was after they had the bulb more than one season.

Scarlet Leader (Ludwig). Grade B blooms, small and adulterated with a dirty yellow-green in throat; petals not wide. One redeeming feature was that all blooms pointed or angled up about 30 to 40 degrees. This is a point that grades the bulb up with the commercial growers, who deal in fancy grades. They do not care for drooping blooms. The thing about drooping blooms is that some are so very good that one cannot resist them.

Ernest Ludwig (Ludwig). A minus; large clear scarlet with only the faintest yellow streaks to be seen in center when closely inspected.

Lady Helen (W. E. Rice). Grade B on the basis of form; petals a little narrow, but this does not hurt it. It would be outstanding if the form were better; the color is excellent. A good clone to be used as a pollen parent; RHS Mandarin Red 17; a self with deeper throat, all of the utmost brilliance. It was named several years ago for Mr. Rice's wife.

Dark Red Bonnet (Commack-Meade). Very clear red and deeper in center; velvety appearing texture; very small but quite graceful and attractive. This is the only Meade strain clone that I have seen and consider good.

Red Glory (Meade Strain). A dull dark red with flecks of lighter white or yellow in center on closer inspection. Hardly worth naming as a clone; small poor form, Grade C minus. This did not bloom for me this year for the reason that it is the only *Amaryllis* bulb that died last December although it received the same treatment as the rest. It was not as hardy here in California as indicated for Meade strain stock in Florida. Perhaps it prefers acid peat soil.

A Van Tubergen scarlet grade B plus; clear scarlet with even, wide petals, 7 inches. The only bad feature was that the petals lacked enough body and became recurved as if the wind were blowing in its face. Another Van Tubergen scarlet did the same thing as to recurving petals. These were S'gnal Red RHS 719/1.

There are a number of Howard & Smith reds that are the equal of the Holland clones and several that surpass them in form and color. I can't resist describing one Howard & Smith pink. This, to me, is a true pink. It has taken me a long time to try to figure out what the growers and fanciers mean by "pink."* I do know that pinks are very scarce and bring higher prices, and the demand sets the price. This one is Geranium Lake RHS 20/2. This year it produced 8 inch blooms with very wide petals, but was more diamond shaped than rounded, but not pointed at the ends. It is somewhat tubular but still has plenty of face, and is very graceful. This was nearly all pink but with some white in center in the form of an abrupt short stripe in the center of each petal near the base. The white blended nicely on the back of the petals so that blooms also looked attractive from the back side. I graded this an A plus but would have made it a double A if it lacked green at the base of the petals. Again this green was not unattractive but, in my opinion, made it more handsome. In its own way I like this as much as I do the clone Doris Lilium.

Maiden's Blush (Commack-Meade). Grade D minus, and marked for discard. It is one that is so common, and may no doubt be duplicated when gathering the harvest of seedling bulbs. A Van Tubergen bulb labeled "pink" came out white with a fairly white greenish tint in center but a faint pink border all the way around the petals varying from a half to three quarters inch in width. Not solid, just sort of delicate. I did not expect this but being unusual, will keep it as a novelty. It has fair form, no stripes. The Maiden's Blush made me think of it.

Salmon Joy (Ludwig). Grade A minus; 8½ inch, very flat clear dark salmon to orange, RHS Mandarin Red 17/2; very clear and nearly a uniform color, except at the base of the petals where there are two linear short yellowish pencil lines on each petal. A previous scape had 9 inch blooms, four to the stem; stems 20 inches tall; a third stem came up 6 inches tall, and had one 8½ inch bloom that had to face up. My wife and I belong to a dancing group which does nothing but round dances, all waltzes, formal dress. Being late in the camellia season, I could not find one to give her for a hair ornament. I asked her if she would like to try an *Amaryllis* and she agreed. So, I brought in one of these 9 inch blooms. Worn on one side of her head, it looked nearly as big as her own head, like something from Honolulu. She demurred and asked if I couldn't find something smaller. My rejoinder was that I had never, ever seen her back out on any kind of a hat however outlandish

*[Editorial note.—*Amaryllis belladonna* var. *Haywardii*, and some of the selections of *xAmaryllis henryae* and *xAmaryllis gladwynensis* are the clearest pink, Carmine, RHS 21, 21/1 and 21/2.]

or absurd and feel perfectly at home wherever she went. She replied, "OK, I'll take your dare." It made quite a hit at the dance and stood up or rather held up beautifully because this one is very sturdy. It lasted nearly a week after in a bowl. Everyone thought it was some sort of exotic hibiscus imported from where they knew not. In Life Magazine that week appeared an illustrated article on flower dresses, flower hats, flower jackets, etc., so that everyone thought that she had just kept herself up on the style of the week.

Van Tubergen "oranges," two bulbs, one a B plus, and the other a C plus. Again the recurved petals.

Queen's Page (Warmenhoven). B plus; dull but clear orange, I suppose; petals recurved spoiling appearance. I mean by that that they over-do it. Some recurved petals do so in a manner that is graceful and pleasing, not as if some one put a curling iron on them.

Three Howard & Smith red picotees with white backgrounds and splashes of red in middle or center. In picotees a fine line of a different color completely encircles the outer edges. The form of these is not usually very good but I do not know why.

White Giant (Ludwig). Grade AA, 7½ inch bloom; very white but there is a little green at the base; broad, flat Leopoldii shape that stands up well.

Bridesmaid. Grade A; 7 inch bloom, moderately green center.

Snow Queen (Ludwig). Grade A plus; 7½ inch bloom.

Nivalis. Grade B, on the basis of very small flowers. They come out in such profusion and are very white which makes up for small size. I thought this so attractive that I put it inside the house where it drew much comment from callers. Green is pronounced in the center but seems to relieve the white and make the flower more attractive.

ONE AMARYLLIS BULB'S FAMILY

Clarence Lionel Buck, *Maryland*

A former outstanding event in Washington, D. C., was the annual show of gorgeous *Amaryllis* in pots held each winter in the U. S. Department of Agriculture greenhouses, then located on Constitution Avenue, near 14th Street. When some years afterward I first encountered a bin full of *Amaryllis* bulbs for sale in a local seed store, it took scarcely a moment for me to become the proud owner of one.

After potting the bulb, and enduring a few impatient weeks of watchful waiting, I was rewarded by the appearance of two flower scapes, one of which bore four and the other five beautiful blooms. This delighted me and stimulated an interest in *Amaryllis* culture which has grown during the years.

The nine blooms faded and nine seed pods grew and matured several

hundred seeds. As I watched this development, I wondered what inherited characters might be present in these seeds. A reluctance to discard or destroy the offspring of such attractive flowers, plus my curiosity about what possible color variations might occur in the plants produced from these seeds, led to the planting of all the seeds in a large flower box. They germinated readily and green blades began to appear above ground in about three weeks, during the month of May.

The seedlings grew outside under the shade of a large tree during the next two summers and during the intervening two winters in the south and west bedroom windows. The third summer the bulbs, then about a half inch in diameter, were removed from the flower box and set out in the garden and some reached size and maturity to bloom the following winter.

About four hundred bulbs were harvested that autumn, the largest being about 1½ inches in diameter. In the rush of digging and storing them on the afternoon and evening of the season's first freeze, about half of the bulbs in bushel baskets and cartons were placed in a tool shed and froze when the temperature unexpectedly dropped to 18° F.

The survivors were numbered as they bloomed and the color and quality of the blooms recorded. I believe the original bulb was of the Mead strain because of its narrow leaves. Of the sixty blooming seedling bulbs recorded to date, forty-four were red like the parent bulb, and nineteen were red and white combinations. Of the forty-four reds, two had a distinct orange shade, and one that bloomed in 1950 bore two flowers each having a somewhat imperfect double set of petals. Unfortunately no seeds were developed from them.

Blossom Record

Number of Flowers	Color of Flowers: Red	Red and White
4	4	0
3	11	3
2	29 (1 double; 1 with 2 scapes)	16
Total	44	19

I still have the original bulb potted and blooming each year although it has never equaled the record of nine flowers produced the first year.

Following the second summer, the bulbs were in the garden, a dozen of the larger ones averaging nearly three inches in diameter, were not dug. The winter was rather mild and the covering of cornstalks, leaves and an old rug protected the bulbs from freezing. However, their inclination to bloom must have been chilled because no flowers appeared the following season. They failed to survive the second and colder Maryland winter in the garden.

I now have a second set of seedling bulbs which represent five different hybridizations, which should bloom this coming season. A neighbor has a similar set of the same hybrids.

Twenty-five seeds of this same group, although two years old, were treated by soaking in 0.2 per cent solution of colchicine for 24 hours but failed to germinate.

AMARYLLIS CHILENSIS

Hamilton P. Traub, *Maryland*

Several years ago an amaryllid was obtained from van Tubergen in Holland under the name, *Habranthus bagnoldii*. When the bulbs flow-

Fig. 14. *Amaryllis chilensis* L'Hérit.

ered it was at once apparent that they had been mis-labeled since the flowering plant fitted the description of the yellow form of *Amaryllis*

chilensis L'Herit. (Sert Angl. 11, 1788; descr. in Traub & Moldenke. Amaryllidaceae: Tribe Amarylleae. 1949, pages 95—96.).

It is a very beautiful pale-yellow-flowered form, the umbel being usually 2-flowered, rarely 1- or 3-flowered. It grows best in a soil mixture to which some ground oyster-shell has been added. It blooms for a long time, from June to late summer. The illustration [Fig. 14] shows one potted bulb in flower. It is best, however, to plant from 6 to 8 bulbs in a single pot so as to obtain the maximum display.

This form is self-fertile, and seedlings may be easily grown from seeds, provided they are grown in soil to which some ground oyster-shell has been added.

Amaryllis chilensis is native to sandy plains of South Chile, where bright red or yellow forms are reported to grow. It is hoped that new collections may be introduced from Chile so that a wider range of colors may be had in this choice subject.

This plant is represented in the Traub Herbarium by nos. 29 and 204, perserved from cultivated plants.

AMARYLLIDS AS GARDEN MATERIAL

William Lanier Hunt, *North Carolina*

Miniature amaryllis, sternbergias and the red *Lycoris radiata* are the best of gardening material for an early fall effect. Only the *Lycoris radiata* have been in Southern gardens in large enough quantities, except in a few communities, to show what they could do until recent years. The writer has, through the years, accumulated several thousand of each. They are now planted in a fall bulb garden in the woods. As the bulbs increase, the garden is simply enlarged to accommodate them. The increase of *Lycoris radiata* is amazing. From a small area where less than a bushel were planted ten years ago, fifteen bushels were dug this summer. Since the bulbs had been planted in rows and spaced evenly apart, it was possible to count them and to estimate that one bulb had produced approximately thirty-five bulbs in the ten years they had been there. *Lycoris squamigera* had increased to one hundred twelve from twelve bulbs in ten years. The increase of *Amaryllis bifida* is considerably less, but sternbergias (*Sternbergia lutea*) are close runners up.

One of the chief landscape virtues of these three bulbs lies in the fact that they can be left undisturbed for about ten years if one plants them in reasonably good soil which has had a liberal dose of bone meal. Perhaps the miniature amaryllises can be left even longer in one place. Sternbergias and *Lycoris radiata* in the garden in question have been flowering profusely every single year for ten straight years. During the four war years, poison ivy, Virginia creeper and honeysuckle made a veritable jungle of the beds. When the vines were removed, the bulbs

were found to be in good condition—apparently none the worse for the experience. Since honeysuckle is evergreen in North Carolina, it seems incredible that the bulbs could have survived the winter shade while their foliage was on, but they did.

The winter foliage of all three of these bulbs is a thing of great beauty and landscape value. Where an evergreen ground cover is needed under deciduous trees, nothing is richer looking than the foliage of these bulbs planted about six inches apart over an area. Now that red *Lycoris radiata* at least, are cheap enough to be bought by amateur gardeners by the hundred and thousand, we can hope to see sights like that in the writer's garden where beds ten feet wide and over a hundred feet long are in full bloom in September and October, and then beautifully evergreen until June. Spring bulbs are interplanted in this composition to provide another flowering season when winter is gone. *Lycoris squamigera* has now been planted, also, throughout one bed for a mid-summer effect like that which Mr. Crippendorf pictured for us in one of the early numbers of HERBERTIA [Vol. 2. 1935, page 128]. As time goes on, still other amaryllids are increasing in this garden to the point where they will be used in vast quantities. The magnificent white flowers of the dramatic *Hymenocallis occidentalis* collected in the mountains of Tennessee and Alabama some years ago are soon to be interplanted in a moist bed.

Another notable virtue of sternbergias, *Lycoris radiata*, miniature amaryllises, and doubtless of other amaryllids, is the fact that they can be planted right under deciduous trees and maintained there. All the large beds described above are under trees. Some are under slippery elms and black locust, the roots of both of which are notorious for their shallow foraging habits. It is well to use a subsoiler in the initial preparation of beds under such trees and as close to the trees as feasible. The beds described above, however, were simply dug only one shovel deep. Some humus was added, a liberal dressing of bone meal, and then the bulbs were planted. Such plantings can be assisted, if need be, with a light dressing of complete fertilizer just as the leaves drop from the trees. The fact that the bulbs use it immediately before the tree roots can get it probably is a strong factor in helping the bulbs along. Inasmuch as sternbergias and *Lycoris radiata* have a way of increasing upwards in the soil so that they finally make almost one solid sheet of bulbs on the surface, an experiment will now be performed this year to see if some old undivided plantings now ten years old can be kept going with a light top dressing of rich soil and bone meal. Many of the bulbs on top cannot reach the soil with their roots until rainy weather comes, and just lie on top of the soil until the ones in the soil have long since flowered and put up their foliage.

SOME TEXAS AMARYLLIDS

THAD M. HOWARD, *Texas*

The *Amaryllidaceae* are represented in Texas by several important genera which are widely known and grown by amaryllis enthusiasts everywhere. On the other hand, a few of our species are so rare that only a privileged few have ever seen them. *Zephyranthes, Habranthus, Crinum, Hymenocallis, Nothoscordum,* and *Allium* are genera represented.

Perhaps the most widely seen but less generally appreciated amaryllids found in Texas are *Zephyranthes*, including the subgenus *Cooperia*, commonly known as "Rain Lilies." Until recently, *Z. brazosensis* and *Z. drummondii,* were the only known members of the subgenus *Cooperia* in Texas. The past few years have seen the welcome discovery of several rare new species and a consequent augmentation of color variation. Before these new species were discovered, the only color known to the subgenus *Cooperia* was white, but now yellow has been added to increase the color range of this genus.

Zephyranthes brazosensis (syn.—*Cooperia drummondii* Herb.) is the most common COOPERIA in Texas. Its fragrant white blossoms may be seen erupting in great profusion from lawns, vacant lots, pasture, and waste places by the thousands over a large portion of the state. They begin blooming in mid-summer and continue into early autumn, the length of their season depending on the amount of rainfall that they receive. After a heavy rain they seemingly sky-rocket out of barren ground overnight and burst into bloom. Although there is much variation among individuals of this species, the largest portion fall into two general types. The first type has a flat, star-shaped blossom which opens early in the evening and is spent by noon of the following day, the flowers turning pink with age. This type is the prettier. Its bulbs average 1 to 2 inches in diameter. The second type has taller scapes, larger bulbs, and slightly smaller flowers, and its blossoms open later in the evening and close earlier the next day. The broader flower segments do not open out flat but roll inward at the edges creating a slight cup-shaped effect.

Zephyranthes brazosensis is persistent in lawns and is not one to yield easily to the ravages of the lawn mower. It is a summer bloomer and winter grower; it is therefore seldom cut often enough to damage it severely. Its narrow grey-green leaves are conspicuous among the dead grass in winter.

Zephyranthes brazosensis takes kindly to cultivation but should not be drowned by impatient watering in the summer. As a matter of fact it cannot be as easily forced into bloom by the over-enthusiastic gardener as one might suspect. When the plant is under cultivation the writer has found that no amount of watering will hurry it into bloom until it "feels" that the proper time has arrived, generally August. It is then

that it makes its strong bid for attention. Although the individual flowers do not last long, the plants bloom several times during a season. Unlike their near relatives the members of the subgenus Euzephyranthes, those of the subgenus *Cooperia* possess long tubes, are fragrant, and bloom at night.

The Giant Rain Lily, *Zephyranthes drummondii* D. Don (syn.—*Cooperia pedunculata* Herb.) is larger in all its parts and is more widely cultivated than any other species of the subgenus *Cooperia*. It differs from *Zephyranthes brazosensis* in that it has a much larger bulb, and wide, blue-green, daffodil-like foliage. Although the flower scape is somewhat shorter (about 8 to 10 inches), the flower itself is almost twice as large as that of *Zephyranthes brazosensis*. Usually a late spring and early summer bloomer, it may occasionally be seen blooming in large plantings during the summer. This species is not as common as *Zephyranthes brazosensis* and is usually found growing in richer soil and where more moisture and shade are available. Like *Zephyranthes brazosensis*, it is a fall and winter grower and is drought resistant.

In addition to the species of the subgenus *Cooperia* already mentioned, two new yellow species—*Zephyranthes smallii* and *Z. jonesii*, and the rare white, *Z. traubii* have been discovered. The yellow color should be a welcome addition to collectors if and when enough stock of these interesting bulbs can be worked up to become available to collectors.

Habranthus andersonii var. *texanus* is another interesting little amaryllid native to our Southwest. It was formerly classed as a *Zephyranthes* but all botanists now agree that it is a true *Habranthus*. It is surrounded by much geographical mystery. How a plant native to Texas can have an identical counterpart growing thousands of miles to the south in Argentina is a wonder to many botanists. Nevertheless, *H. andersonii* grows naturally in South America and the variety *texanus* in Texas. Regardless of its ancestry, the variety *texanus* is a beautiful flower and a wonderful garden subject. Its interesting coloring and amaryllis-like form alone are enough endorsement to gardeners who have never grown it. It has a warm old-gold-colored interior and an exterior finely penciled with coppery-red lines which have given it the common name "Copper Lily." The throat has a small blotch of the same coppery color. There is some variation, however, in the amount of markings found in the different individuals of this species. For example, one individual in a planting of several hundred bulbs in the writer's garden stands out clearly as a distinct specimen. It has broad, rounded petals much like those of a fine amaryllis, and there is a brilliant maroon red blotch in the throat and richer interior and exterior coloring. An effort will be made to save the seeds of this one for propagation of the strain. The throat of some individuals is colored a deep maroon purple in a fashion similar to that of *H. brachyandrus;* others are without any markings in the throat and have very little exterior penciling.

Like the blossoms of other members of the rain lily tribe the flower of the variety *texanus* usually lasts but one day. The scapes range in height from 6 to 12 inches the flowers being about 1½" in diameter. Its

long blooming season and profusion of blooms, however, make it a "must" for the garden. In its native habitat its blooming period may extend from July to September, the length of its season depending on rainfall; but under cultivation it begins to bloom a month earlier. It is easily cultivated, requiring only a warm, sunny exposure and an alkaline soil. It is a fall and winter grower, becoming deciduous in the summer. If planted in large numbers, it may be had in bloom almost continuously throughout the summer. It is quick to respond to a heavy soaking from the garden hose and can be bloomed repeatedly in this manner. Although slow to form offsets, it sets seed freely and can be quickly reproduced from seeds. Though widespread in mesquite flats across the state, *Habranthus andersonii* var. *texanus* is rapidly disappearing in many localities, its former habitats having fallen to the farmer's plow. Its bulbs deserve to be more widely grown by gardeners and commercial growers, but the latter should build up their stocks from seed. Since most of the bulbs offered are collected in their native habitats, the supply may eventually become exhausted.

Among the subgenus *Euzephyranthes* of the genus *Zephyranthes* are found two yellow species, *Z. longifolia* and *Z. pulchella*, which grow in the western and southern parts of the state, respectively. Both are interesting additions to the garden.

The *Crinum* group is represented in Texas by one species, *Crinum americanum*. It extends as far west as southeast Texas. While it is not a common plant there, one may occasionally find it blooming in roadside ditches or along the banks of canals and bayous perhaps as far west as Houston. Unlike most Crinums, *C. americanum* is not a dependable garden subject since it requires a constant and adequate supply of moisture to maintain itself.

The genus *Hymenocallis* is represented in Eastern and Southeastern Texas by two species. The first, *Hymenocallis galvestonensis*, or Texas Amerindian Lily, bloom along the coastal plains in the spring. It may be found growing inland as much as 100 miles from the coast in marshy river bottoms. It is a desirable Amerindian Lily for the garden because it is usually in full bloom in early spring. The blooms are not as striking, however, as those of *H. occidentalis*, our other native species. *Hymenocallis occidentalis* is sometimes known as the western or inland Amerindian Lily. It is unique in that it sends up its flower scape in mid summer after its foliage has disappeared. The large white flowers are extremely showy. *H. occidentallis* differs from *H. galvestonensis* in having glaucous-green foliage, larger, showier flowers, and a later blooming period, and also in losing its foliage before the flowers arrive. Being native to East Texas and Louisiana, it is widely grown by gardeners in that region.

The Alliums of Texas occur in numerous forms, but all of them are not well enough known to be correctly identified. *Allium coryi*, found in West Texas is our only yellow species and is quite rare. *A. nuttallii* (syn.—*A. helleri*) is widely spread throughout south central and west central Texas. Its pink flowers vary in shade from almost white to deep

rose-purple. It thrives in gravelly soil but will grow in nearly any kind. *Allium mobilense* (syn.—*A. mutabile*) is a white *Allium* growing slightly taller than *A. nuttallii* and having a denser flowered scape. *A. canadense* is similar in appearance to *A. mobilense* but grows taller, is more vigorous, and far less showy. It is characterized by bearing bulbils in the scape in the sparsely flowered umbel. Common throughout the state, it is usually found in moist places, especially along river banks. The identity of other species, some of them very beautiful, is not well known. Most of the alliums make excellent garden subjects, an exception being *A. canadense*, which will quickly become a nuisance. They are quite showy when used as edgings in flower borders.

The genus *Nothoscordum* is represented in Texas by a sole species—*Nothoscordum bivalve*. It is so common along railroad right-of-ways, in lawns, vacant lots, roadside ditches, and mesquite flats, that nearly everyone is familiar with it. *N. bivalve* is very similar in appearance to the Alliums but lacks the characteristic onion odor. In fact, the white or creamy star-shaped blossoms are very fragrant. It is strange that few people have ever noticed its fragrance; the species is so common that its good qualities have probably been overlooked. The lack of appreciation given to it can be shown by its common names—"False Garlic" and "Crow Poison."

The blossoms of *N. bivalve*, although not striking, are very pleasantly perfumed and are produced over a long period of time. They are unique in that they open at mid-day, close at night, and remain closed on cloudy or rainy days. Under cultivation, each bulb sends up scape after scape in a long succession until June or July, when it becomes dormant. Then dormancy is of short duration, however, as the plant has another blooming season in early autumn. Because this wildling is so prolific in reseeding itself, when admitted to the flower border, it is advisable to remove its flower stems as soon as the blossoms fade.

THE 1951 DAFFODIL SEASON

GRANT E. MITSCH, *Chairman*
Narcissus Committee, Canby, Oregon

While it is quite the normal trend to have flowers of one kind or another blooming through most of the winter here in the Willamette Valley, the last few winters had been unkind to precocious plants, but the 1950-1951 season came on auspiciously and gave us reason to believe that once again we would enjoy more normal weather. The moist congenial atmosphere encouraged early growth and I think we had never witnessed previously so much foliage and buds in January, many of the plants, particularly of seedlings not lifted for two years, being nearly twelve inches high by the end of the month. Polyanthus primroses had been blooming for weeks and summer blooming annuals were still alive, while *Anemone fulgens* was full of buds with a few open blooms, providing fiery brilliant cut flowers in mid-winter. *Narcissus asturiensis* (better known as *N. minimus*) opened January 8th. One could wish that this delightful elfin flower increased more readily.

This propitious weather was not destined to last, however, for on January 28th, a cold wind came in from the Northeast bringing a frigid air mass from across the Canadian border. As the wind increased in intensity, the temperature dropped, and for several days the storm continued, the biting drying wind combining with a seventeen degree thermometer reading. Although this was not excessively cold, the soft lush tissues of actively growing plants were first frozen and then dehydrated. Primrose growers lost thousands of plants, and thousands more which did not entirely succumb, lost their foliage and buds, and did not recuperate for the normal blooming season. Daffodils suffered a great deal more than in the previous colder winters, as growth was too far advanced and too soft to cope with such conditions. Veteran Daffodil growers witnessed for the first time the outright killing of foliage, and in a few cases, buds, on some varieties. Of course, most varieties were injured little, if any at all, and those sustaining most damage made a partial recovery by growth of that portion of the foliage not yet above ground when the freeze came. It was only a few of the varieties farthest advanced in growth that were affected; others quite as tall were unscathed. WHITELEY GEM suffered quite severely; MALVERN GOLD bloomed with many broken stems; and ROUGE lacked its usual brilliant color and was very deficient in substance. The cyclamineus hybrids, FEBRUARY GOLD and MARCH SUNSHINE seemed quite immune to the vagaries of the weather. TROUSSEAU bulbs received from California, and consequently earlier to grow than home grown stock, had buds nearly ready to open, and they suffered heavily, the soft succulent stems rotting off in some instances, and in others, the perianth opened to expose a blackened incompletely formed corona; still others developed quite good

flowers. BRUNSWICK, which is very consistently good, and one of the very early varieties, was somewhat lacking in quality. Even later blooming flowers such as BAHRAM which was so magnificent the year previous were lacking in substance after this ordeal. The foliage of SILVER CHIMES was almost completely blackened, but being only a few inches high when the freeze came, it made quite an amazing recovery, putting up a very creditable showing of flowers and producing large sound bulbs.

Following the severe storm, the weather was colder than previously, and while FEBRUARY GOLD, MITE, and a few others bloomed toward the end of February, we had few good outside blooms until near the end of March. The first week of that month produced heavy snow nearly every day but most of it would melt before the following day's fall. The low temperatures were perhaps fortunate as the frost damaged foliage might easily have become infected by foliage diseases had the moisture been combined with higher temperatures.

While inclement weather held sway in the garden, it was our privilege to enjoy some splendid blooms grown in pots. These were kept outside until nearly ready to bloom but protected from freezing. ROUGE came in good form and very early; perhaps not quite as highly colored as it normally grows in the open, but still a good flower and one coming before the other red cups. ZERO developed magnificent blooms, both from bulbs grown in a pot, and from those grown in the garden; its large size, great purity, and early blooming bringing it to the forefront. Never have we seen more magnificent blooms of CONTENT—it certainly should make a fine forcing flower. Its form, size, balance, and texture seem to leave nothing to be desired, and in addition it is a good keeper. More than that, we have found it one of the best for breeding. A pot of TRUTH with eight or nine fine large perfect immaculate blooms will be long remembered—a breathtaking group. These too kept in good condition a long time. Both TRUTH and CONTENT are excellent in the garden but still finer grown in pots.

Of all the varieties which were grown in pots, doubtless the favorite of all with our visitors was MABEL TAYLOR which produced larger blooms of better form than grown in the open, and the coloring was clearer pink with less of the orangy-salmon undertone although less brilliant. It shows great promise of becoming a splendid commercial variety when stocks become plentiful. One of the very late blooming pinks is ROSE OF TRALEE which came nicely potted, but being so late, and being one which could not be hurried, it opened but little before bulbs of it bloomed in the field. WILD ROSE remains about the clearest in color of the pinks although it varies much in intensity from year to year.

In general, we have not had too good results with red and yellow Daffodils grown in pots, but one of CHUNGKING gave superb blooms of perfect form and brilliant coloring, surpassing any we had seen previously. GREEN ISLAND produced perfect circular flowers of exquisite finish and enchanting coloring, and we are coming to value it highly for breeding, both for the fine form and good substance that it often imparts to its progeny, and for the occasional distinctive pink in its descendants.

The lovely immaculate CHINESE WHITE performs well either in pots or in the garden, and it is difficult to visualize a more transcendently lovely flower. It is true that it demurely hides its face for a day or two but this failing can be excused when it lifts its head exposing its serene loveliness for all to view. Very free blooming is RUBRA which gives perfection of form and finish with bright orange red coloring, it being one of our favorites for cut flowers. It is one of the most free seeders that we grow, and nothing has given a higher average of lovely cut flowers among their progeny. A pot of RED HACKLE gave flowers of quite startling brilliance, while CROMARTY was the peer of all the yellows so grown.

In the field, one of the very first flowers to open was CIBOLA, an intense deep golden yellow from MALVERN GOLD x TRENOON. Inasmuch as it was nearly ready to open when the cold spell struck, it was damaged considerably by the freeze. Quite a large flower for one so early, it has much substance and lasts a long while, either on the plant or as a cut flower. Several early seedlings from KING OF THE NORTH and KANDAHAR by CONTENT had blackened foliage but still gave creditable blooms; others showed little damage to the plants. From this series came several quite outstanding flowers in selfs of butter yellow and sulphury lemon, and a few quite striking reversed bi-colors of good form and substance.

By the end of March, flowers began opening rapidly, and April was a warm dry month with drying winds which cut short the life of the flowers. Daffodils which normally last about three weeks looked very tired after ten days or two weeks, and it was quite useless to attempt properly to evaluate new seedlings in the most exposed locations. Ordinarily, winds that blow at this season of the year are accompanied with relatively high humidity, and while the flowers may get bruised somewhat, their life is not greatly shortened. Red cupped flowers were, on the whole, rather disappointing, and many of the pinks failed to develop much color. Yet, in spite of this, there were many good specimens. White Daffodils, of course, came very pure and clean.

Some years ago, out of a very small lot of CHEERIO x MARKET MERRY seedlings, we selected one which has since been called ARDOUR. It is a very circular large flower with broad overlapping perianth, and has much substance and splendid vivid red and yellow coloring. Although it does not fade badly, the edges of the cup burn in hot sun or wind. We find it one of the most valuable from the standpoint of breeding, and its pollen used on KLINGO and BAHRAM gave a number of flowers of good color and form, one especially from KLINGO having a large flaring, almost flat crown of most intense red which has been very resistant to weathering. An exceptionally large flower with immensely broad perianth of deep yellow and a wide spreading highly colored crown came from MARKET MERRY x CARBINEER, and from TAMINO x CHUNGKING we had another large flower somewhat like CHUNGKING but larger.

The quest for good yellow trumpets goes on and we bloomed several rather promising candidates from CAMBERWELL KING x MORTLAKE, one being a large flower of very good form borne on tall strong stems having a perianth broad like that of KANCHENJUNGA, the noted white trumpet,

but flatter in form. St. Issey x Galway produced some good border line flowers, but out of Camberwell King x Galway came a series of very nice trumpets, the best of which appeared at least equal, if not superior, to any yellow trumpet seen here.

Trostan x Zero gave some very nice white trumpets, of which two looked especially good, the flowers being of good substance, and borne on tall strong stems. Some extremely large well formed very white flowers were derived from Killaloe x Broughshane, but these could have taller stems. Two or three large whites with massive trumpets descended from Pearl Harbor x Kanchenjunga, and another very white flower of large size with a much frilled flaring trumpet of better quality than one might anticipate was produced by Ada Finch and Kanchenjunga.

Pinks readily become an obsession with a Daffodil breeder, and with the many good varieties now available, progress should be rapid in the next few years. Here, Wild Rose is still one of the clearest pinks; Rosario, the most perfect flower; and Mabel Taylor, the most spectacular. Rose of Tralee has less color but comes with fine form and is one of the very latest of large Daffodils to flower in adaition to being one of the most prolific bloomers. Interim is quite distinctive from other pinks being a flower of high quality and very valuable to the hybridist. From it crossed with Mabel Taylor both ways virtually every seedling was pink, several having very good color and nice form. One of the best had a wide band of rosy orange with an interesting frill—quite unique. Several distinctively formed pink trumpets resulted from Pink Lady x Shot Tower, one having rather a long salmon pink trumpet with a heavy frill, and another a large bell shaped trumpet of similar coloring. But the real surprise of the year came in a seedling from Green Island and Glenshane a flower of quite large size with very rounded broad perianth rather reminiscent of Green Island and a rather short but flaring crown of apple-blossom pink whose color held for the life of the flower. Coming from a fourth year seedling, we hope that it does not deteriorate in any way nor lose any of its coloring in future bloomings. A most interesting little flower like a miniature Wild Rose with a frilly cup came from (Mitylene x Mrs. Backhouse) x Wild Rose, while Shirley Wyness x Mabel Taylor produced large numbers of ruffled pinks, several being quite good flowers. Other than those already mentioned, Lough Maree has proven one of the most popular of the named pinks we grow. It is quite a large flower with a large crown of lilac toned pink, and retains its color well. Pink o'Dawn is a flower of good quality and nice coloring, and has proven a good breeder. Larger and of somewhat better quality than Wild Rose but with slightly paler coloring is Lisbreen. Rosegarland like most of the other pinks varies in coloring from year to year, but at its best is one of the finest of the group and it comes on good tall stems. There are many other pinks of good quality, among them being Pink a Dell and some of the new Holland pinks which we have not yet had opportunity to properly evaluate.

Chinese White pollen used on Green Island produced a series of

exceptionally finely formed flowers, among which was the most perfect bloom of the season, an ivory white of flawless form much like its pollen parent in design, but with heavier substance and the flower held at right angles to the stem. Such flowers are ideal for exhibition and serve admirably for arrangements. Several somewhat similar but not quite so perfect, and slightly smaller flowers came from RUBRA x SYLVIA O'NEILL. Virtually every flower from this cross was of ideal type for cutting, and most were white with white or cream cups banded with lemon, buff, or orange, and sometimes daintily frilled.

Thus far more consideration has been given the seedlings than named varieties, but many of the latter were better than normal despite the adverse weather. The whites in particular were fine although a bit shorter lived than usual. There were superlative blooms of the beautiful CANTATRICE, and the niveous ZERO was exceptionally fine, while MORAY and COOLIN were larger than we had ever seen them previously. Because of its exceptional substance, GREEN ISLAND gives a percentage of flowers that are a bit rough, but it was very smooth this year. All of the sister seedlings and half sisters of CHINESE WHITE were good as usual; our choice falling to FOGGY DEW, TINSEL, GLENSHANE, and SYLVIA O'NEILL. We are quite partial to the small crowned, light colored flowers as many of these combine perfection of form with airy grace making them admirably suited to arrangements. Though no longer new, SAMARIA with its smooth milk white perianth and frilly-white bordered green eye is a great favorite. The smaller CUSHENDALL is ideal for table pieces as is also ANGELINE with its delightful gold rimmed cup, and the green eyed poet, CANTABILE. ALBERNI BEAUTY is one of the very last to bloom and has rather large flowers, similar to SAMARIA but with lemon frill, borne of very tall stems. SILVERMINE, SILVER SALVER, and POLAR SEA, all pure whites with green eyes are distinctive from one another and each is a gem for cutting.

As indicated above, red and yellow flowers were not as good on the whole this year as on the average, but there were numbers of varieties which gave a very good performance. GARLAND and DUNKELD are two flowers of most attractive form with wide flaring red crowns and very broad overlapping rounded perianths. NARVIK should be one of the leaders of the future because of its excellent form, good keeping qualities, and brilliant coloring, although it is not one of the larger flowers. Not so smooth nor of exhibition form, RED RIBAND is certainly one of the most striking, being of clear yellow with a strongly contrasted ribbon of bright orange red in a flower about the size of its illustrious forebear, FORTUNE. ARMADA and CEYLON doubtless are two of the best new ones.

Most of the red and white flowers are not large, but FERMOY would be rated a large one in any section. It is outstanding in its class, having a very large flat white perianth and big flaring crown of orange shading to yellow at the base. Another outstanding member of this group is KILWORTH whose good form and brilliant color make it most desirable. It is among the short cupped varieties that we find the most brilliant coloring, and LIMERICK is still a favorite with us. PAPRIKA, TEBOURBA,

Bravura, and Otranto are others of excellent quality. Then there is Blarney, a beautiful flower with smooth white perianth and salmon orange crown bordered primrose. The unique Artist's Model is of similar coloring, but instead of having a border of different color, it is flanged and rolled backwards touching the perianth. Several of the Lewis varieties from New Zealand are quite distinctive; Autowin has a large broad flat white perianth and the flat saucer shaped crown is yellow with a most distinct frilled border of bright orange red. Marie Louise is of similar form but with a lemon frill, and Papanuie Queen somewhat the same but a larger flower.

Even though our season was much shorter than usual and we were forced to be absent from home too much of the time, we had many beautiful flowers and these notes touch only some of the highlights. It is amazing at times to see how Daffodils can come through trying adverse conditions and still give a good performance. Naturally there are some disappointments but there are pleasurable surprises to counteract these, and the fancier is optimistic enough to anticipate that next season will be better!

CRINUM ZEYLANICUM (?) IN FLORIDA

Wyndham Hayward, *Florida*

The so-called Milk and Wine Lily, most widely grown of any Crinum species in Florida, shown in the accompanying photograph, is probably *Crinum zeylanicum* [Fig. 15]. This is subject to corroboration by further research into the identity of the various *Crinum* types which have virtually made Florida their own in the past several centuries since Ponce de Leon's arrival in 1513.

The foliage is handsome, forming a miniature fountain of its light greenery, leaves up to two or three feet long, and three or four inches wide at the widest. It is found in numbers on country places, and in the older parts of the towns and cities, sometimes a long line extending a hundred feet or more along a driveway or across the front of a lot.

The flowers are strikingly handsome, purple-red or wine colored and striped with white edging, and the reverse of the petals similarly marked. The scapes and necks of the bulbs are reddish purple, and the bulb tissues on the outer parts are bright reddish purple. The species seems to prefer high land, contrary to some kinds of Crinums, and is almost dormant all through the dry, cool winter months. With the coming of the rains in June, hundreds of the bloom scapes will be seen coming up all at once in various parts of Central Florida, and the new foliage appears at the same time. The flowers open in the early evening and remain widely expanded until the heat of the next day. On cool

mornings they may last wide open till noon. Usually they tend to close partly by 10 o'clock in the morning.

The flowers have a strong, rich, sweet perfume, and when brought into the house make a fine show for an evening bouquet used at late dinner or evening house party or reception. There are few Crinums so effective and spectacular in full bloom. The umbel will have a dozen to 20 buds, which open two or three at a time on succeeding nights. A strong bulb may be six to eight inches in diameter. The neck is comparatively short, two to six inches long. Usually the bulbs are four or five inches in diameter.

Fig. 15. *Crinum zeylanicum* (?). Photo by Wyndham Hayward.

Baker gives *Crinum zeylanicum* specific rank, while Herbert in 1837 classed it as a variety of *Crinum ornatum*. The bulb is apparently one of a large group of similar *Crinum* species, widely distributed in tropical Africa and Asia. Baker calls it the "commonest species in cultivation" and it is certainly that in Florida, despite its slow growth, both from seed and by offsets. To have produced the large number of bulbs growing over Florida the species must have been well established in the Sunshine State for two or three centuries. Possibly an importation by early Spanish seafarers from the Far East, as the Manila-Panama-Acapulco-Vera Cruz sailing route to Spain went up the East Coast of Florida channel for many years.

The bulb is globose, leaves six to ten, thin, lorate and bright green, with wavy margin. The peduncle is strong and heavy, never needing

support while in bloom unless a storm or accident lays it low. The seeds set readily and several usually form from an umbel. The peduncle falls sideways to the ground when the seeds become too large and heavy, and the seeds continue to ripen and mature on the end of the scape as it lays on the ground. Many times they sprout, take root and grow right in the same place and new bulbs are formed. Growth is slow, possibly ten years or more being required to obtain a large bulb from seed.

This species should be a valuable one for hybridizers. Possibly it was one of the parents of the wine colored hybrid *Crinum* clone ELLEN BOSANQUET, created by L. P. Bosanquet at Fruitland Park, Florida, a few decades back. The individual flowers of *C. zeylanicum* when fully expanded are remindful of an *Amaryllis*, and up to six inches in diameter, in the best specimens. There seems to be but little variation among the specimens of this species as seen growing in Florida yards and gardens whether raised from offsets or seed. It requires no special culture, and may be said to make its own way into the hearts of the people by its sheer beauty and spontaneous eruption of bloom stalks, with the coming of the summer rains.

SELECTION OF NEW HEMEROCALLIS HYBRIDS FOR GARDEN VALUE

GEORGE GILMER, *Virginia*

The best way to tell whether you like a hybrid *Hemerocallis* is to grow it in your own garden two or three years. Some produce the best flowers at the beginning of the blooming period, others at the end. They vary some from year to year. Something can be told by seeing them grow for others. It would take six or eight visits at two-week intervals to see all of mine in bloom. Visiting and selecting plants is not very practical especially if you want early and late varieties as well as mid-season.

Seeing them grow for another is far from satisfactory. Many are as fine at sunset as at morning, while others are ruined by a full day of hot sun. Some grow plants protected from fading by shade while others grow theirs in the full sun. Some cultivate theirs frequently while I grow mine under mulch with no cultivation. There are differences in rain and temperature and soil. Night temperature affects the formation of red pigment in some.

Relying on ratings is far from entirely satisfactory. A plant can rarely get wide enough distribution under six years to get a good rating. At least half the best in any year are surpassed by new introductions within six years. Sixteen of the hundred having the highest rating in 1950, published in 1951, had been discarded by me as no longer in my

best two hundred. More would have been dropped if I had all the good new ones. A number will be discontinued this year. I believe at least half the "best 100" have been surpassed.

With three hundred or more introductions most years no one can have money, time or space for them all. The introductions of a breeder have a general family resemblance. This is natural because they are bred from the same stock and selected by the same grower. I find that I can count on plants from some breeders to give 90% or more excellent specimens, while with some breeders I have discarded over 75% as worthless.

Norton specializes in early and late varieties; Wheeler in broad petals, small to medium, mostly dark colors; Cook in sunfast yellows and vigorous; Taylor and Lester in pastel shades; Sass in large sunfast; Culpeper in large flowers, vigorous.

The leading breeders are a stable group. Rarely does one cease except from death or extreme old age. In this group there are usually one or none in a year. The ratings of hybridizers made for your climate, soil and taste would change but little in ten years. There is a 100% change annually in the new introductions. If you get a rating of five or ten of the best breeders, they could easily supply you with 90% of the new varieties you need to keep up to date collection. Try a few others annually so as to find now and then a new breeder to add to your selected group, as the older ones may die or you want the excitement of more new varieties. I have tried the plants of some thirty or more breeders, but 90% of my best are from ten. Do not let over 10% of your plants be the product of any one breeder. This is easy for there are dozens of active breeders. Then make your own rating card for each breeder. You will generally find new introductions better than the old ones. If you try, say Stout's, and find 80% satisfactory, you can buy his new introductions and almost certainly find 80% will please you. If you find only 10% of "John Doe's" do well for you you should drop him as his new ones would probably be only 10% satisfactory.

I get all the new ones from six breeders. Two of these in the last ten years have only introduced six or eight. There are a number who rgularly introduce around a dozen annually. Milliken introduced only one, High Noon, in 1948, none in 1949 and 1950 and only one in 1951. Such extreme conservatism usually means high quality. There are five hybridizers whose plants are 50% or more excellent in my garden and I get some of theirs most years. There are some that rate lower and I try a few now and then, when my friends insist on giving me some. There are over a dozen I am planning to rate.

A. B. Stout and John B. Watkins bring out all of their new ones at never more than $3.00 a plant. They are both careful breeders. You can try three or more of theirs for less than some ask for a single new plant. Do not go too fast. Feel your way slowly. There are new ones coming far ahead of any now available.

HYMENOCALLIS NARCISSIFLORA

LEN WOELFLE, *Ohio*

Much as we dislike to change, once we have acquired a habit, it is not logical to continue an error knowingly. *Ismene*, long considered a separate genus in the AMARYLLIS FAMILY, is so closely related to the *Hymenocallis* that it is now classified by botanists as a sub-genus of the latter. That species long known under the incorrect appellation of *Ismene calathina* has now been correctly titled *Hymenocallis narcissiflora*, literally, the narcissus-flowered *Hymenocallis*. We should accept the correct name and use it in all future references to this plant.

I believe this fine species could be grown in the open ground anywhere in this country during the summer months, given handling as it receives here in southern Ohio. It is not at all particular as to soil. Most anything from a stiff loamy soil to a sandy loam should be satisfactory, with an acid reaction of neutral to slightly alkaline.

It will tolerate some shade and thrives in full sunlight. It may be grown in large pots or in the open soil in the border or garden over summer. It completes its growth cycle in about five months, when the bulbs may be dug, the tops and roots cut off near the bulb, and then stored dry and warm over winter in a temperature above 50 degrees F. In warm climates where frost will not reach the bulbs, it may be left in the ground the year around, being dug only to separate the bulbs to prevent crowding.

The beautiful, waxy-white texture of the bloom and delightful fragrance as a cut flower, make this a most desirable plant, and so easy that even a child can be sure of success with it.

They are particularly attractive when planted in clumps of three or four bulbs in some sunny corner, or if planted in front of *Lycoris squamigera* so that they may lend their foliage when these plants bloom on naked stems in late summer. The foliage too, could hide the yellowing foliage of tulips or *Narcissus*, since that of *Hymenocallis narcissiflora* remains in good condition the whole summer, come storm or drought.

They seem to be very disease free, and the only insects causing a problem are the Narcissus Bulb Fly and the Lesser Bulb Fly when they are in the neighborhood. I have found *Gladiolus* Thrips damage to buds of late blooming *Hymenocallis* in September, but never on *H. narcissiflora*, as it blooms from June to July before these pests become active.

THE PERUVIAN DAFFODILS

WYNDHAM HAYWARD, *Florida*

The sub-genus *Ismene* of the beautiful *Hymenocallis* group of amaryllids is, thanks largely to the efforts of English and Dutch growers and hybridists, attracting more attention than in many decades. They are somewhat particular in their culture, but may be classed among the easier bulbous plants to grow when they are given proper treatment, and their reward to the horticulturist and flower lover in the form of pure ecstatic beauty and sheer fantasy of nature is immense.

The foundation species of this deciduous section of the *Hymenocallis* is *H.* (*Ismene*) *narcissiflora*, which was known to Jaquin in the late 18th century as *Pancratium narcissiflorum*. Baker, the last botanist

Fig. 16. *xHymenocallis* clone ADVANCE.
Photo by Wyndham Hayward.

to monograph the *Hymenocallis* group, made *Ismene* a sub-genus of the same, although its character is so distinct as to warrant a separate generic place in the opinion of some students of these plants.

It is a good sized bulb at best, up to 3 inches in diameter, dormant in winter and producing handsome foliage atop a long sheathing neck, and having two-edged scapes bearing umbels of two to five of the most exotic-appearing and extravagantly fashioned white flowers in all the realm of the amaryllids. Only the closely related *Elisena longipetala*, recently itself assigned to *Hymenocallis* by MacBride in his Flora of Peru, can surpass it as a creation of nature's fantastic imaginings.

Back in William Herbert's day of the early 19th century, these

choice bulbs attracted much attention of horticulturists, and the learned Dean reports a hybrid between *H. narcissiflora* and the unique yellow species, *H. amancaes*, the result being figured in the Botanical Register, 20: 1665. He called this hybrid *Spofforthiae*, and describes the flower as sulphur yellow.

This hybrid was apparently lost with the years, and the cross was repeated by the Dutch firm of Messrs. C. G. van Tubergen, Ltd., and the resulting duplicate cross was called SULPHUR QUEEN. This bulb is now available at reasonable prices both in Europe and America from specialists. The Van Tubergen firm deserves high praise for the promotion of the cultivation of all the members of this sub-genus, which have been listed for many years in its catalogues. Their continued interest in the group has doubtless contributed largely to the increase in popularity of the bulbs in recent years.

Besides *Hymenocallis* (*Ismene*) *amancaes*, which is a golden-yellow-flowered species, found in a certain valley of *Amancaes*, near Lima, there are available today the elegant *Elisena longipetala*, from the Andes of Peru and lower Ecuador. There are two other species of *Elisena* listed by Baker of which nothing is known in cultivation, *E. ringens* and *E. sublimis*, all from the Peruvian Andes.

xHymenocallis clone FESTALIS is an horticultural hybrid raised by the late Arthington Worsley, of England, leading specialist of the *Amaryllis* Family in the 20th century until his death. *xHymenocallis* clone FESTALIS crossed back on *H. narcissiflora* gave a seeding which proved to be more free-flowering and more vigorous in constitution which has been called ADVANCE [Fig. 16], in the trade. The original type of *H. narcissiflora* tends to be shy blooming in the trade, often splits up into too many offsets and sometimes rots away at the base, whether in the ground or in storage.

This new hybrid ADVANCE is now available in quantity, and multiplies well from mature bulbs. It has replaced to all practical purposes the old *H. narcissiflora* species. The flower of ADVANCE is larger than that of the old type.

Almost as large and vigorous as ADVANCE is SULPHUR QUEEN, the splendid light yellow hybrid. In this the cup is very large and more open than in ADVANCE, probably due to the more open funnel shape of the corona in AMANCAES, which can be seen in Plate 184 of 1940 HERBERTIA. Bulbs of ADVANCE grow about as large as those of the old *H. narcissiflora*, up to 2½ inches diameter.

Mr. Worsley's FESTALIS is still a popular pot and summer garden subject among connoisseurs of fine bulbous subjects, but is not nearly as well known as it should be. It has a fascinating fairy-like quality with its long curving segments and frilled membrane. The petals are waved and twisted. The plant will grow outside in warm climates where the conditions are favorable. The bulbs of *H. amancaes* are of delicate constitution and should be handled in pots with protection indoors or under glass, except in warm climates.

All these beautiful bulbs can be obtained as dormant stock in

winter and with good care can be forced into bloom indoors or under glass in the spring. As usually sold they are without roots, but if dried off in their original pots, a good part of the root system, which is thick and heavy, will remain alive and will help the bulb to re-establish itself in the spring after repotting or replanting.

There is a similar Ecuadorean bulb bearing a single large Hymenocallis-like flower which was recently placed in the new genus *Leptochiton*. This is one of the finest things in the *amaryllids* but only a few bulbs are in cultivation. It should have Ismene treatment. It was formerly called *H. quitoensis*.

Two or three of the Mexican species of Hymenocallis including *H. harrisiana* and *H. concinna* are suitable for Ismene-type culture as they go dormant in winter. *H. harrisiana* is available in the trade.

The bulbs of the Ismene group like those of *Nerine* require particular attention to drainage. Herbert in his AMARYLLIDACEAE of 112 years ago says that "absolute rest in winter is essential to this genus, which delights in very light soil; . . . its cultivation is easy when these two requisites are observed." The bulbs are a complete failure in heavy, moist soil, or in a potting mixture too heavy, rich or well manured.

A very sandy soil with just a little leafmold or compost is recommended, with extra care to assure perfect drainage and special caution in watering. In garden culture, the bulbs should be dug with all their roots by the time of November frosts, stored dry in flats of dry sand or earth, and kept moderately cool and dry until the following March or April. Plenty of sunlight is good for the garden types.

ALLIUM GIGANTEUM IN THE ROYAL PARK, VRANA, BULGARIA

J. C. TH. UPHOF, *Tampa, Florida*

It was during a pleasant morning in the middle of the month July, 1936 that an Officer of the Royal Court in Sofia handed me at Hotel Slovienska Beseda a note in German from Dr. Iwan Buresch, Director of the Royal Institute for Natural History. The message translated in part is as follows — "We will drive today at 9:30 o'clock to the Palace Vrana. There you will meet His Majesty the King. Please come to me at 9 o'clock." We left the Palace grounds in Sofia by auto at the exact hour and in less than an hour we arrived at the main gate of the Summer Palace Vrana near the outskirts of Sofia where I was soon presented to His Majesty Boris III, King of the Bulgarians. He was standing in the Royal Park about half a mile from the gate.

In this park is an enormous wealth of plant species. There is more to be seen than in an average European botanical garden. Moreover,

most species and numerous varieties are hardly found in other collections, because the King wanted to have unique collections.

When passing through various parts of the extensive park, the King explained to me many interesting features of his plants and the way he got them. Suddenly we stood before a large area. It was a field covered with a vast number of all kinds of herbaceous plants. I had never seen such before. It could not be compared with the well known herbaceous borders because it was too wide and too extensive. The King told me that during the Turkish rule of his country, this space was covered with a number of old buildings and stables, which he had removed. The soil was thoroughly dug and heavily manured. This he planted with a variety of tall herbaceous plants. It was a kind of experiment. There were numerous species of *Centaurea, Lilium, Hemerocallis, Paeonia, Phlox, Iris, Rudbeckia, Papaver, Rodgersia, Senecio, Eryngium, Astrantia* and many other genera. There were heavy, lovely flowering specimens of *Eremurus robustus* and *E. Elwesi*. Floricultural experiments were also made with a number of herbaceous Balkan species

Among this mass of plants the King drew my attention to an interesting *Allium* which stood out in contrast with the rest of the species that were planted. He said to me [in German], "That is *Allium giganteum*. The bulbs I got from Asia. Please photograph it for me?" Fortunately the photo proved to be good with which he was very much pleased. A reproduction of it is shown in this article [Plate 15]. The King also told me that he wanted me to have seeds of this *Allium*. Later he sent me some seeds at Amsterdam which I received a few years later in Florida. They came to me too late; consequently they had lost the power to germinate.

It was E. Regel who first described this *Allium* species in GARTENFLORA *32:* 97, 1883. His description is accompanied by an excellent illustration on plate 1113. It is surprising that this attractive species has not become widely known as an ornamental in different gardens. *Allium giganteum* Regel produces a robust flowering stem that reaches a height of 1 to 1.50 meter. There are 5 to 6 leaves which have a width of 5 to 10 cm. The veins are not easily visible. The stem and leaves have a strong glaucous color. The spathe is bivalvate and half as long as the umbel. The flower cluster is large, heavy, carrying a dense cluster of literally hundreds of flowers. The perianth of these flowers is light-violet which makes a flowering specimen very beautiful, and on account of the large size of the plant, it is something unusual for an *Allium* species. The bulbs are from 4 to 6 cm. in thickness, and are ovoid in shape.

Regel states that the plant comes from the Himalayas. At first he hesitated to describe the plant as a species, and considered it a form or variety of *Allium stipitatum* Regel which he had described in GARTENFLORA 355, 1881 and which was illustrated on plate 1062. Later he concluded that he had to do with a distinct species. There appeared later also a description of this species in BOTANICAL MAGAZINE of 1885 with a colored illustration on plate 6828.

Allium giganteum Regel, in the Botanic Garden, Royal Park, at Vrana, near Sofia, Bulgaria.

Plate 15

'Twas the Night Before Christmas

Plate 15

'TWAS THE NIGHT BEFORE CHRISTMAS

Mrs. Mary G. Henry, *Pennsylvania*

Christmas day 1950 was one of the gayest days of the year in my tiny greenhouse. This was in happy contrast to bygone years when, before I started to grow *Amaryllis*, there was little in bloom during the month of December excepting a few orchids in the "orchid corner" of the greenhouse.

A few days ahead of Christmas it just seemed as though the *Amaryllis* wanted to get ready for the great day and rejoice along with the rest of us, and they certainly decorated the little greenhouse to the very best of their ability.

The flowers shown in the picture, Plate 16, face the glass dining room door.

The *Amaryllis* making the handsome striped effect is *Amaryllis organensis* var. *compressa*, whose striking flowers are green, embellished with dark red markings. It is an impressive and exotic looking flower and stands high among my favorites.

The *Amaryllis* on the lower right is *xAmaryllis henryae* with its sister seedling not far off. Both of these are of an exquisite soft and gentle rose-pink.

xAmaryllis gladwynensis was utterly gorgeous arrayed in brilliant velvety rosy carmine and already opening its second stalk of four large flowers.

xNerine clone Lady Stirling Maxwell, in rich crimson, always brings to my mind happy memories of Edinburgh. It was a gift from my esteemed friend, Sir Wm. Wright Smith.

A small yellow *Cyrtanthus* opens the winter season for this genus and in the rear is a large pale pink *Crinum* whose foliage is as handsome as its flowers.

Plate 16. [See opposite page.] 'Twas the Night before Christmas—Amaryllis and cypripediums in flower at the Henry Home, Gladwyne, Pennsylvania, in 1950. *From left to right*, *Cypripedium harriseanum* clone G. S. Bell, large maroon flower, and barely visible against the background; hybrid *Cyrtanthus*, with three open flowers; *xAmaryllis henryae*, carmine pink, one flower open, the other just opening; *xCypripedium maudiae* (albino), in foreground; *xAmaryllis gladwynensis*, stunning, "currant red, orange glow," two stalks, 4 flowers each, one stalk past flowering with one seed pod; *Amaryllis organensis* var. *compressa* with one flower open; again, *xAmaryllis henryae*, carmine pink, with one flower open; in background, *xNerine clone* Lady Sterling Maxwell, carmine. It should be noted that in upper right, the lower two tepalsegs of *Crinum moorei*, pink-flowered form, may be seen. Photo Philadelphia Sunday Bulletin.

Christmas Eve, about 9 o'clock, the members of the Gladwyne Fire Company arrived as usual on their huge red fire engine to the tune of Christmas carols from a loud speaker and with a real live Santa Claus. The children, grandchildren and I were thrilled and excitement was intense. We entertained our visitors with a simple spread and soon they said good-bye 'til next year.

After filling the stockings we trimmed the tree 'til nearly 12.

Then came the beautiful midnight service in our little country church, that told us Christmas had come.

It was about 1 A.M., when I returned from church. The Christmas tree sparkled through the front door.

As usual I visited the little greenhouse for a last good-night.

It was early Christmas morning now and surely decked in all their fresh bright beauty the *Amaryllis* were worthy of the day.

THE HEAT FACTOR IN RELATION TO AMARYLLID FLOWER COLOR

L. S. Hannibal, *California*

For a number of years the variation in the flower color of *Brunsvigia rosea*, the Cape Belladonna Lily, has been noted without a plausible answer being discovered. In all instances the uniformity of pigmentation seemingly covered most of the state. The summer of 1950 was exceptionally warm and here is Sacramento the theromometer hung above the century mark for two full weeks between late July and early August. The Cape bulbs were a dirty bleached out white. This was sharply contrasted by those observed growing up along the northern California coast line near Eureka. Temperatures there had held to a foggy 60-70 degree chill, and the flowers were a near coral red. The answer was evident: Heat. And it has been verified conclusively this year. The daytime temperatures at the opening period of the individual blossoms of the flower umbel definitely establish the amount of red pigmentation that is present in the blossom.

Similar color variations appear in *Crinum*. *C. Moorei* is an example. One of the most striking cases of color variability has been observed in a *C. bulbispermum* (syn.—*C. longifolium*) which Mr. Wyndham Hayward gave me some years ago. Either shade or overcast make a striking contrast in color. It is not unusual to have both white and deep rose blossoms in the same umbel at the same time. Those that open when it is cool are always deeper toned. Light and heat intensity have no apparent effect once the individual florets have opened fully.

THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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[An integral branch of the APLS, and functions as a comprehensive Committee for the advancement of the Amaryllids.]

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Correspondence about the registration of plant names should be sent directly to Dr. Norton, *4922 40th Place, Hyattsville, Maryland,* and a self-addressed, stamped envelope should be enclosed if a reply is expected.

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Mr. W. Quinn Buck, in charge of Daylily Trial Garden, Los Angeles Arboretum, 291 No. Old Ranch Road, Arcadia, Calif.

Note: Introducers of new daylily clones should send plants directly to the Trial Gardens for testing. As soon as practical each trial garden will publish, in HERBERTIA, lists of the 10, 25, 50 and 100 best daylilies, on the basis of the clones tested, for the climatic region in which it is located.

DATA CARD FOR HEMEROCALLIS

When describing daylily clones, all breeders and growers are requested to use the Official Data Card for Hemerocallis, devised by the eminent artist and horticulturist, J. Marion Shull, and full described in HERBERTIA, Vol. 7, 1940, and Vol. 14, 1947. These cards should not only be used in describing new clones but also for the description of all older clones grown in the various climatic regions.

For information write to—

Mr. E. Frederick Smith, Membership Secretary,
The American Plant Life Society,
Box 2398, Stanford, Cal.

SCORE CARD FOR HEMEROCALLIS

For the official score card for Hemerocallis see HERBERTIA, Volume 7, page 126, 1940. Reprinted in Vol. 14 (1947), page 37.

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FLOWER TYPES AND SCORE CARD FOR HYBRID AMARYLLIS

For classification of flower types and score card for Hybrid Amaryllis see PLANT LIFE *6*: 43-46. 1950.

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AMARYLLID PUBLICATIONS

For information on past issues of Herbertia, see pages 170-171. Here also are brief reviews of amaryllid publications in book form.

PLANT AWARDS FOR 1951

For awards to amaryllids in 1951, see page 171.

OTHER PLANT COMMITTEES

For other Plant Committees, see page 170.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 90.]

Zephyranthes sessilis Herb., Amaryll. 175. 1837. Leaves slender, semi-cylindric, green . . . twisted; bud sessile, the tube more than 1/24th [inch long?], with a pair of very minute prickles at the base of each petal; the limb white, the sepals becoming more or less reddish on the outside; scape deflexed at time of seed-shedding; style conspicuously deflexed. Mexico.

Zephyranthes grahamiana Herb., Amaryll. 175, pl. 29, f. 2. 1837. Leaves unknown; scape 3 inches tall; spathe 1 3/16 [inch long], tubular half way up, inflated at the base, bifid (or fenstrate) above; bud sessile, ¼ inch long; perianth 1⅞ [inch long], its tube very slender, ⅞ inch long, the limb 1 inch long, the segments oval, more than ⅜ [inch] wide (pale purple, becoming yellowish below, in dry specimens); filaments ⅜ inch [long], free; style suberect, surpassing the tube by 3/16; stigma-lobes obtuse; anthers 1/24 at long as the limb. Mexico.

Eucharis lehmannii E. Regel, Gartenflora 38: 313—314, p. 1300, f. 1 & 1b. 1889.—Glabrous throughout; Bulb attenuated toward the apex from a rounded base, invested by an entire tunic; leaves radical, 2, oblong-elliptic, attenuate into the petiole, acuminate into a rather obtuse apex, with a central midrib, numerous longitudinal nerves, and 2 or 3 folds running to the tip; scape rather flattened, with one leaf longer, the other shorter; umbel terminal, 4-flowered supported by linear or linear-lanceolate scarious bracts which are half as long as the peduncle; peduncle about 3 cm. long; the tube of the white flowers slender, slightly shorter than the lobes of the perigonium, only slightly ampliate at the apex; segments of the 6-parted limb spreading, slightly undulate, the exterior ones ovate-oblong, the interior ones ovate and scarcely longer than the exterior ones; stamens attached in the throat, shorter than the segments of the limb; filaments connate at the base into a petaloid blade, above the base into a 6-parted cup, the petaloid blade cuneate-dilated, deeply bilobed at the apex, with the midrib excurrent from the sinus of the lobes as an antheriferous thread slightly longer than the lobes; ovary inferior, obtusely trigonous, ovate, 3-celled; style filiform, crowned with a 3-lobed stigma; ovules many, in 2 series in each cell; seeds aborted, few.

Hymenocallis longibracteata Hochr. in Bull. N. Y. Bot. Gard. 6: 265. 1910.—Leaves ribbon-like, glabrous, sessile; peduncle probably slightly shorter than the leaves; flowers 3—6, disposed in a small head; spathes very large, scarious, sometimes longer than the tube of the corolla; tube of the corolla medium-sized the segments equaling the tube, linear, acute; filaments long, almost equaling the corolla, dilated at the base into an infundibular staminal cup with a more or less fringed mouth; anthers linear, long, dorsifixed at the lower ⅓ or ¼; style conspicuously longer than the stamens, filiform, its apex capitate.—Leaves.

as far as seen, about 45 cm. long and 1.4 cm. wide; peduncles as far as seen, to 38 cm. long; bracts to 12 cm. long or longer; tube of the corolla 11—12 cm. long or longer, the segments to 10 cm. long and 0.5—0.6 cm. wide; filaments filiform, about 5 cm. long; anthers 1.5—2 cm. long and 1—0.5 mm. wide; staminal cup about 1.7 cm. in diameter (wide) and 2 cm. long; style surpassing the margin of the staminal cup by about 7 cm. Mexico, Orizaba (Fred. Mueller, s.n., June 18, 1853, in the herbarium of the New York Botanical Garden).

Hymenocallis biflora Koch et Bouché, in Wochenschr. 9: 369—370. 1866.—Leaves perennial, spreading, lorate, but more narrow at the base; scape 2-flowered; tube of the corolla longer than the segments; corona finally expanded, almost rotate; cells of the ovary possessing 4 or 6 ovules. Brazil.

Eucharis ulei Kraenzlin, in Engler, Bot. Jahrb. 50: Beibl. 111, pp. 4—5. 1913.—Bulb not seen by me; leaves 2, very long-petiolate, oblong, acute or short-acuminate, thin-membranous in drying, the petiole narrowly margined at the base, to 35 cm. long, the blades 20—22 cm. long, 7 cm. wide; scape slender, more than 50 cm. long, the floral bracts ovate, acuminate, slightly longer than the pedicels, about 2 cm. long; flowers in the single specimen seen 4, the pedicels about 1.5 cm. long (varying in length in the succedaneous flowers); ovary semi-globose, horizontally flattened above, 8 mm. long, 1.2 cm. in diameter; corolla-tube slender-cylindric, almost making a semicircle, deflexed, abruptly divided into 6 segments which scarcely differ among themselves and are ovate, acute, and spreading, the tube about 3 cm. long when extended, 1 mm. in diameter, the segments 2.5 cm. long, 1 cm. wide or slightly narrower; filaments connate for about the lower ⅓, the free part subquadrate, the upper margin obtusely toothed or shouldered, the whole "paracorolla" 7 to 8 mm. high, divergent above, 1.3 cm. in diameter at the upper margin; anthers linear; style slender, scarcely shorter than the corolla-segments; stigma small.—Flowers white, blooming in June.

Allium sessile R. E. Fries, Act. Soc. Sci. Upsal. ser. IV. 1: 165. 1905.—Bulb with a long neck; stem very short entirely hidden by the sheaths of the leaves; leaves very many, linear, flat; umbel not bulbiferous, many-flowered; pedicels three to many times as long as the perigonium; sepals oblong-lanceolate free, whitish, marked with a green nerve; filaments simple subulate-filiform, free; ovary ovate, almost twice as long as the style. Province of Jujuy: in rocky places, at about 4000 meters altitude, Cuesta de Santa Catalina, Feb. 1, 1901 (Kurtz 11546).

Amaryllis parvula Seub., Mart., Flora Brasil. 3(1): 145. 1847.—Leaves terete; scape filiform, 1-flowered, the flower erect, on a pedicel which is ⅓ as long as the spathe that is split from there up; stamens half as long as the perigonium.—Bulb the size of a small cherry, hidden by a blackish tunic, the neck ¾ inch long; leaves slender-filiform, few; scapes 2, 2—3 inches long, slender; spathe tubular below, acute at the

apex, nerved, becoming purplish, half as long as the flower; pedicel equaling the ovary; tube of the perigonium short, terete; sepals oblong-lanceolate, the exterior ones broader, acute, plainly nerved, rose, rather obscurely punctulate, the interior ones rather obtuse, white; alternate filaments longer than the others; anthers linear, curved, attached below the middle, incumbent; style slightly surpassing the filaments; stigma 3-lobed.—A minute species immediately recognizable by its elegantly bicolored perigonium and short-pedunculate flower. The synonym of Herbert because of the length of the style and the different country (Peru) is doubtful. It grows in central Brazil (Sellow 3587); perennial.

Zephyranthes longifolium Arech., Anal. Mus. Montevideo 2: 286—287. 1899.—Bulb ovoid, about 5 cm. long, 3 cm. in diameter, the exterior tunics membranous, brown; leaves cylindric, 80—120 cm. long, 5—6 mm. in diameter fistulose, glabrous; scape stout, about 25 cm. long; spathe about 5 cm. long, cylindric, bifid above, nerved, with erect valves that are subulate at the apex; umbel quite often 4-flowered the pedicels 4—5 cm. long; perianth rose, about 5 cm. long, the segments oblong-lanceolate, 1 cm. wide, equaling the narrowly funnelform tube; stamens half or ⅓ as long as the limb; anthers recurved; style 3-fid, surpassing the anthers; capsule about 1 cm. long; seeds flattened, the testa black. Uruguay.

Eucharis bouchei Woodson & Allen, in Ann. Missouri Bot. Gard. 24: 181. 1937.—Bulbous herb; bulbs tunicated, broadly ovoid, about 6—8 cm. in diameter; leaves ovate-lanceolate, acuminate at the apex, attenuate at the base, 35—42 cm. long, 10—11 cm. wide delicately membranous, completely glabrous; petioles 25—30 cm. long, completely glabrous, shallowly canaliculate, slightly winged at the base; inflorescence umbellate, 4—10 flowered; peduncle rather stout, 55—60 cm. long, glabrous; bracts subfoliaceous, 1—1.5 cm. long; pedicels about 2.5 cm. long, glabrous; lobes of the perianth ovate, short-acuminate, 3—3.5 cm. long, about 1.3—1.5 cm. wide, spreading, the tube funnel-form measuring up to 3.5 cm. long and 15 mm. in diameter, later 5 cm. in length, slenderly coniedilated, the mouth measuring 6 mm. in diameter; filaments membranous-dilated, trapezoid, connate at the base, about 1.2 cm. long; anthers about 3 mm. long, caducous; ovary 3-celled, subglobose, measuring about 3 mm. in diameter; style very slender; stigma shortly 3-lobed, well exserted; fruit unknown. Panama.

Brunsvigia insizwae A. Zahlbr., in Ann. Nat. Hofmus. Wien. 15: 27. 1900.—Leaves ligulate-lorate, gradually narrowed toward the apex and obtusely acuminate, completely glabrous, rather stout, dark green (?), half-orbicular and almost dilated at the base, somewhat flexuous along the margin, smooth, 36—41 cm. long and (at the middle) 5—6 cm. wide; scape erect, quite stout, glabrous, shorter than or subequaling the leaves; umbel 10—14-flowered; spathe 2-leaved, the segments triangular, rather obtuse at the apex, glabrous, whitish, 8—9 cm. long and at the base 4—6 cm. wide; pedicels smooth, slender, 19—23 cm. long, suberect.

narrowed toward the apex; perigonium almost campanulate, 55—60 cm. long, pale carmine, the segments erect or suberect, never spreading, oblong-lanceolate, gradually narrowed toward the base, about 2 cm. wide at the middle; stamens slightly shorter than the perigonium; ovary turbinate, 1.5 cm. high and 1 cm. wide, glabrous; style declinate.—Collected by Krook (Penther 1548) at Mount Insizwa, Griqualand East, blooming in January.

Nothoscordum fictile Macbride, in Field Mus. Nat. Hist. Bot. Ser. 11: 12. 1931.—Bulb ovoid 2—3 cm. thick with a long neck 1—1.5 dm. in length; stems very short, apparently absent, completely hidden by the sheaths of the leaves; leaves prostrate, linear-oblong, narrowly long-acuminate, 1—2 dm. long, 4—10 mm. wide; pedicels flexuous, slender, 1—2 cm. long, plainly unequal; flowers white, 4—5 mm. long; perianth-segments oblong-elliptic, shortly connate at the base; filaments subulate, about 2.5 mm. long; anthers brown, scarcely 1 mm. long; style scarcely 1 mm. long; immature capsule 4 mm. long, apparently subovoid.—Collected at Carumas, Miquegua, Peru, between February 21 and March 6, 1925, Weberbauer 7262 (type in Chicago Natural History Museum).

Eucharis narcissiflora Huber, in Bol. Mus. Para, 4: 543. 1906.—Leaves (without the petiole 17—18 cm. long) lanceolate-ovate, acute at the apex, contracted at the base into a petiole that is equally as long as the blade; scape to 40 cm. long; umbel 10-flowered; pedicels slender, 2—4 cm. long; corolla-tube slender, slightly dilated at the apex, the segments ovate-lanceolate, 2 cm. long, 6—10 mm. wide; staminal cup 5 mm. high, free; style scarcely surpassing the filaments.—It differs from all other species in its many-flowered umbels and smaller flowers (4 cm. in diameter). A similar plant, but smaller in all its parts, was collected by Castelnau, also in the Pampa of Sacramento in 1847, and was described by Baillon under the name *Calliphruria castelnaeana* Baill. (Bull. Mens. Soc. Linn. Paris No. 143, March 7, 1894). Baillon considered this plant to represent an intermediate stage between *Calliphruria* and *Eucharis*.—*E. narcissiflora* is frequent in wet places in the forest between Sarayacu and Catalina, Pampa del Sacramento, collected November 25, 1898.

Hymenocallis stenophylla Urb., Fedde, Repert. 21: 53—54. 1925.—Leaves linear, not at all or but scarcely narrowed at the base, sessile, gradually acuminate to the apex, the apex itself rather obtuse or acute 30—40 cm. long, 0.7—1.3 cm. wide; peduncle 45—55 cm. long, in the pressed condition to 6 mm. broad, 5- or 6-flowered; involucral leaves lanceolate from a triangular base, rather obtuse, up to 5 cm. long; flowers sessile; tube of the perianth very narrowly linear, 9—11 cm. long, about 1 mm. thick, the lobes shorter than the tube, gradually narrowed at the apex, up to 3 mm. wide at the middle 7—9 cm. long; stamens united below by a membrane and at that place forming a funnel up to 30 mm. long; the free portion of the filaments 3 cm. long; anthers linear, attached at ⅓ their length, 14 mm. long; style surpassing the

anthers.—It grows in Cuba, Wright s.n.; in low almost marshy savannas near Jagüey Chico, province of Santa Clara, blooming in August, Ekman 16994 (type).—Related to *H. praticola* Britton & Wilson which differs in its linear-lanceolate leaves which are slightly narrowed below and its peduncle being only half as long; all other characters seem to be the same in both.

Hymenocallis sonorensis Standl., in Pub. Field Mus. Bot. Ser. 17: 229—230. 1937.—Bulb (a perfect one not seen) about 7 cm. long and 5 cm. broad, long-necked; leaves sheathing at the base, about 6, linear, 18—30 cm. long, 10—12 mm. wide beyond the middle, gradually long-attenuate toward the obtuse apex, every one long-attenuate toward the base, glabrous, many-nerved, the margins smooth; scape about 30 cm. long, slender; flowers 4, closely sessile; valves of the spathe whitish, narrow, up to 4.5 cm. long; ovary ovoid, narrowed and almost beaked, almost 2 cm. long; tube of the perianth very slender, about 10 cm. long, slightly more than 1 mm. thick, the segments narrowly linear, 6.5—7.5 cm. long, 1.5 mm. wide; corona almost 2 cm. long; filaments slightly shorter than the segments of the perianth; anthers linear, 1.5 cm. long; style very slender, slightly longer than the perianth.—Mexico: collected in a valley at Alamo, Río Fuerte, Sonora, July 1, 1936, H. S. Gentry 2267 (type in the herbarium of the Chicago Natural History Museum).

Haemanthus arnoldianus De Wild., & Th. Dur., in Bull. Soc. Bot. Belg. 40: 30—31. 1903.—Bulb tunicated, 5—7 cm. broad; leaf-bearing stem produced after the scape; leaves 5 or 6, oblong, minutely cuspidate, attenuate into the petiole at the base, the blade 6—7 cm. wide (young), the lateral veins about 12 on each side, the transverse veins very numerous, oblique; scape lateral, red-spotted at the base (according to Dewevre), long-pedunculate, the peduncle thick, about 20—75 cm. long; umbel many-flowered, about 10—15 cm. broad, subglobose, about 30—80-flowered, bracteate; bracts lanceolate, rose, spotted, 3—4.5 cm. long; flowers pedicellate, the pedicel rose, 15—35 mm. long; perianth rose (violet in drying), the tube cylindric, 10—12 mm. long, the segments linear, acute, narrow, 1-nerved, 22—25 mm. long and about 1 mm. wide; ovary green; style red, slightly shorter than the stamens; filaments red, about 30 mm. long, flattened at the base; anthers brown, 1—2 mm. long; pollen yellow. Congo.

Haemanthus curysiphon Harms, in Engl. Bot. Jahrb. 19 (Beibl. 47): 27—28. 1894.—Precocious; bulb globose: leaves not yet fully developed, short-acuminate at the apex; scape lateral, cylindric, rather thick; umbel about 30—35-flowered, the valves of the spathe oblong or oblong-lanceolate, acute or acuminate; pedicels sometimes almost half as long as the flowers; tube cylindric, erect, slightly ampliate at the apex, ⅔ to ¾ as

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 166.]

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PREFACE

The general issue for 1952 is devoted primarily to some species and hybrids of the genus *Hibiscus* of the *Malvaceae*. Mr. E. Sam Hemming describes the new Mallow Marvel, Annie J. Hemming, Prof. Ballard reports on hybrid vigor in *Hibiscus* breeding, and Dr. Hava contributes an article on the Chinese *Hibiscus*.

Dr. Corliss reports on a joint meeting with other organizations in the Southwest Region. The issue is concluded with reviews of some outstanding books dealing with plants and plant problems.

Hamilton P. Traub
Harold N. Moldenke

December 21, 1951

Zephyranthes insularum Hume ex Moldenke, **sp. nov.**, (syn.—*Zephyranthes insularum* Hume, Herbertia 6(1939) : 123, pl. 150. 1940, *anglice.*). Herba bulbosa; foliis 9—21 cm. longis, 4—7 mm. latis tenuiter concavis, ad apicem obtusis; pedunculo 12—15 cm. longo, 3 mm. lato; spatha 2 cm. longa dimidio tubulosa superne bifida; umbella uniflora; pedicello 3 cm. longo; flore declinato albo, extus rubello-suffulto, ad basin viridi; ovario 4 mm. longo; tubo tepalorum 2—4 mm. longo; segmentis sepalorum ovalibus 3.8 x 1.6—2 cm., ad apicem rotundatis; segmentis petalorum ovalibus, ad apicem rotundatis, 3.1 x 1.8—1.9 cm.; filamentis incurvis 9—12 mm. longis; antheris 1 cm. longis; stylo 2.5 cm. longo; stigmate trifido, lobis filiformibus.

Zephyranthes plumieri Hume ex Moldenke, **sp. nov.**, (syn.—*Zephyranthes plumieri* Hume, Herbertia 6(1939) : 127, pl. 151. 1940, *anglice.*). Herba bulbosa; foliis 1—3 lineari-filiformibus erectis 6—23 cm. longis, 1.5 cm. latis; scapo 17-27 cm. longo; umbella uniflora; spatha 3—4.3 cm. longa, parte inferne tubulosa 1.3—2.9 cm. longa, extremitatibus plerumque fenestratis; pedicello 2—3.5 cm. longo; flore erecto 5—6 cm. longo; ovario 3 x 4.6 mm.; tubo tepalorum 2 cm. longo; segmentis sepalorum spathulatis vel anguste ovatis 3.5—4 x 1—1.3 cm., ad apicem acutis; segmentis petalorum spathulatis 3.5—4 x 1 cm., ad apicem acutis; staminibus in ordinibus 2 dispositis, ordine uno 1.3—1.5 cm. longo, ordine alio 1.8—2.3 cm. longo; stylo 4 cm. longo; stigmate trifido, lobis linearibus 6—8 mm. longis.

Harold N. Moldenke

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THE PERFECT MALLOW MARVEL

E. Sam Hemming, *Maryland*

About fifty years ago, while herbaceous foreman at the Meehan Nurseries in Germantown, Pennsylvania, the late Ernest Hemming decided to attempt the improvement by hybridization of the native marsh Mallow or hardy *Hibiscus*. Using the three wild forms *Hibiscus moscheutos*, *Hibiscus palustris*, and *Hibiscus coccineus*, he made numerous crosses and recrosses. He produced a strain of seedling Mallows that were eventually marketed under the name of Meehan Mallow Marvels. These were exhibited at the Jamestown Exposition and were received favorably by the gardening public. The color of the flowers ranged from pure white through the shades of pink to dark red, the size of the flower was increased so that in some plants they were nine inches in diameter. The foliage varied tremendously from entire leaves to deeply cut leaves, and from coarse hairy leaves as in *Hibiscus moscheutos* to shiny dark green leaves.

In spite of the favorable reception of the plants it was Mr. Hemming's opinion that the plants had been marketed prematurely and that further improvement was both possible and desirable. In the premature marketing there were two mistakes made; none of the plants were perfect in that (a) all of them had at least one undesirable characteristic, and (b) because of the slowness of vegetative reproduction they were sold as a seedling strain and not as ramets of clones.

When Mr. Hemming established the Eastern Shore Nurseries, Inc., Easton, Maryland with his son to carry it on, he decided to take up the problem of further improvement in the Mallow. The perfect plant he sought, must have all four of the following characteristics: (1) a flower of beautiful color, (2) a flower with overlapping petals and opening flat, (3) rich shiny green foliage with no pubescence, and (4) a medium sized plant about 4 feet high without coarse habit. Assembling a number of his former plants he started crossing and recrossing, discarding all plants that did not have what he desired until he finally succeeded in getting the plant that met his qualifications about ten years ago [See Fig. 17]. Since that time the plant has been propagated until there is now a sufficient quantity for the present offer to the public. The plant has been patented, (plant patent #835) and has been named Annie J. Hemming and will be introduced to the public in the January 1952 issue of Better Homes and Gardens.

The new Mallow is an herbaceous perennial that bears large, brilliant, luminous red flowers about six inches in diameter and has overlapping petals with the flower opening flat. The flowering period is very long; starting to bloom early in July, it continues through August and September and in Maryland well into October. The foliage is a rich dark green almost like the shrubby tropical forms. A single two year

plant bore by actual count 250 blooms in one season. Each flower lasts a day, and while it is not a cut flower, the stems can be cut and put in water and a succession of buds will open.

The plant seems to be quite hardy in Maryland where it has been grown without protection. It has withstood a temperature of 2° F. below zero. In the colder sections of the country it might be safer to protect the plant by mounding as is done with a Hybrid Tea Rose. It is presumably as hardy as a rose.

Fig. 17. Hybrid *Hibiscus*—the perfect Mallow Marvel, ANNIE J. HEMMING. (Plant Patent No. 835).

The plant is best used in borders and given plenty of room, a spacing of at least five feet, and a single plant gives you a wonderful display of color. The plant will grow in almost any soil and location, in fact the parents were marsh plants, but while they will grow in marshy spots and near the seashore, yet they respond best under good garden soil conditions. A beautiful plant, it will stand considerable abuse and neglect and is quite tough; it is very easy to transplant successfully. This Mallow will grow and last many years under ordinary garden care and give annual shows of gorgeous bloom.

A NEW HYBRID HIBISCUS

W. R. Ballard, *Maryland*

The Mallow Marvels are showy summer blooming perennials with large flowers somewhat resembling hollyhocks. There is quite a range of color from white through various shades of pink to deep red. Until the advent of the Japanese beetles these hibiscus were relatively free from injurious pests but this new enemy seems to be very fond of the hibiscus flowers particularly those of the lighter colors. Fortunately these beetles have now greatly decreased in numbers in the vicinity of Washington, D. C.

The mallows are slow to start growth in the spring. Eventually they make sizable plants with a heavy fleshy root system which makes them difficult to transplant. To propagate desirable forms it is necessary to divide the clumps and this is a slow and laborious process.

Nurserymen generally grow the Mallow Marvels from seed and sell them only in assorted colors. The purchaser cannot therefore be assured of the color he may want, excepting the new Mallow Marvel, Annie J. Hemming, described in the preceding article. It would be a distinct advantage if varieties could be developed which would come true from seed.

These hibiscus have a place in the perennial border as specimens or as a background for lower growing sorts. They bloom in midsummer when the border is often lacking in color. While the flowers are similar in form to those of the hollyhock, the effect of the plants in the garden is quite different. The tall stately habit of the hollyhock is replaced by the wide spreading plant of the Mallow Marvels. The hollyhock has largely disappeared from many gardens because of its susceptibility to the rust which gives the plants a disreputable looking appearance soon after blooming.

Some years ago some one gave me a few seeds of *Hibiscus coccineus*, the Southern scarlet form and one of the parents of the Mallow Marvels. I was told that this species would be hardy if the seedlings could once get established. This has proved true and I have had them blooming in my garden for several years. Incidentally the Japanese beetles have not bothered them appreciably.

I had never seen the rich red color of *H. coccineus* in the Mallow Marvels and wondered if it could not be developed. I happened to have a pure white Mallow Marvel with no color markings and it occurred to me that this would be a good place to start. Accordingly crosses were made between these two forms. When the seedlings bloomed the flowers were of a pure deep red but not exactly a duplicate of the species. However, the seedlings were remarkably uniform in character and apparently had acquired considerable hybrid vigor [Fig. 18]. The flowers were

larger than either parent and the plants were very vigorous in growth. The plants are growing on the edge of a marsh where there is a constant supply of moisture and get to be about seven feet in height. Under ordinary garden conditions they would probably not get so high.

It is possible that a nearer approach to the color of the Southern species could be secured from the second generation seedlings but there

Fig. 18. *Hibiscus* breeding:—Increased size due to hybrid vigor in hybrid *Hibiscus* (center), obtained by crossing *Hibiscus coccineus* Walt., (5½ inches across face) ♀ (right), with white-flowered hybrid *Hibiscus* (Mallow Marvel) ♂ (left).

has not been time to determine this possibility. However, the hybrid makes a striking appearance, and the fact that it comes practically true from seed in the first generation makes it easy to reproduce it simply by growing plants from seed secured by crossing the two parents.

CHINESE HIBISCUS ON THE GULF COAST

WALTER C. HAVA, D.D.S., *Waveland, Mississippi*

The Chinese *Hibiscus* (*H. rosea sinensis*), and more recently the Hybrid *Hibiscus*, for years have graced many of our deep southern gardens. Many of our older well established plants are of the more common varieties, while the younger ones are predominantly the hybrids. With the introduction of the single and double hybrids, with their flowers of vivid color and beautiful shapes, and a better knowledge of their cultural requirements, garden enthusiasts are becoming more hibiscus conscious.

Ordinarily, this plant is very well suited to this locality. We have very nearly a sub-tropical climate, having winters with a very few light freezes of short duration. There are winters when large well established plants in protected locations, retain most of their foliage. But this last winter proved a great surprise to us. We had more freezes than usual and they were of greater intensity. One of them was a record breaker. We did not believe that down here the temperature could drop to 12 degrees F. and lower. Consequently most gardeners were caught with no provisions for protecting their hibiscus. Naturally the loss was heavy. Possibly the rapid elevation of the temperature to 65 degrees F., with the hot sun shining on these frozen plants, contributed greatly to their loss.

We have a peculiar condition existing here. Our communities are strung out for about 75 miles along the Gulf of Mexico. The winter temperature varies sometimes as much as 7 to 10 degrees depending on your proximity to the shore line. There is a belt of about one-half mile along the beach, in which the weather is much milder than it is further back. The water seems to "temper the temperature." Gardeners in this belt experienced less loss than did those further back from the beach.

I am very much indebted to those gardeners who so kindly made an inventory of their *Hibiscus* losses. So as to be more accurate, we purposely waited until the middle of May to make this check. They made the following report. Most of the small plants left out in the garden perished. Many of the older plants, seemingly dead, are beginning to sprout at ground level. Many gardeners impatiently dug up their plants

too early, believing them dead. With a little patient waiting, they would often have been rewarded by seeing their hibiscus begin to grow again. It is lamentable that our greatest loss was among the newer hybrids. Our City Park and neutral grounds suffered a loss of about 75%. The Parkway Commission had just entered into an intensive program of hibiscus planting, with plans to increase it this year. It is to be hoped that their unfortunate loss will not discourage them. Winter before last, we enjoyed hibiscus blossoms for 11 months of the year. Those gardeners along the Gulf Coast, with large plantings of hibiscus, report about a 30% loss. Blossoms will be delayed this year, but with so much new wood, we should have more flowers.

Plants left in the garden over winter can be protected very effectively by heaping a mound of earth around their trunk. The height of the mound is determined by the size of the plant, 12 inches being sufficient for the average one. Heavy mulches of leaves, saw dust, rags or paper, etc., seem to do more harm than good. Our very frequent winter rains keep these materials much too damp. The cone of earth dries off quickly. Too much moisture during a period when these plants cannot use it, causes more loss than does very cold weather. The rule that I follow, is to limit moisture for plants that have shed their leaves, but allow more to those that retain their leaves. I had the unfortunate experience of losing many of my well started potted young plants. We made an error in placing the pots on a paved part of the hot house floor, in three inches of damp saw dust. The cement prevented the excess of moisture from draining off. Experience is a good teacher, but too often a very expensive one. I shall not forget this lesson. Hibiscus intended to be placed in the hot house over winter, and which are to be planted in the ground are prepared in the early fall for their transfer. A long narrow sharp spade is used, one made for digging trenches for sewer pipe. The spade is sunk straight into the ground for about 12 inches deep, describing a circle 6 inches away from the trunk. This distance is varied, depending on the size of the plant. This operation severs the longest roots, and a more concentrated root system develops in this smaller circumscribed area. Shock is therefore minimized when the plant is finally taken up, for transfer to the winter quarters. After balling, the small ones are placed in gallon cans, the larger ones in 5-gallon cans and the still larger ones in hampers that have been lined loosely with wax paper. Water should be used judiciously.

Cutting material is obtained from these plants just before they are balled. Terminal shoots are pruned back enough to obtain one or more cuttings with proper eyes. These branches would wither anyway and also be in the way in the hot house. This is a splendid opportunity to get valuable rooting stock. Cuttings are again obtained in early summer Some of the large center branches are removed to prevent foliage from becoming too dense. These heavy wood branches are fine for cuttings. They are prepared in 10-inch lengths similar to the lighter wood from terminal branches, but a stronger rooting hormone is used. Hormodin #3 or Rootone #10 is necessary for this heavy wood, while the #1 hor-

mone powders are used on the lighter woods. I have a preference for the heavy cuttings. While they root more slowly, and do not produce leaves as fast as the light wood, in the same length of time we have a larger plant with a more abundant root system.

I have found it advantageous and well worth the additional effort to place each cutting in an individual can. Holes are punched in the sides and bottom with a beer can opener. This gadget facilitates the hole punching procedure. Something like a soup or tomato can is of ample size. The rooting medium is made up of equal parts of loam, coarse sand, peat and leaf mold. The use of this rooting mixture together with the can, has the following advantages: the cuttings can be left in the cans until it is convenient to set them out, the roots can develop without danger of crowding other cuttings, and roots with their ball are not disturbed in the least when transplanted. I have left them in cans for 6 months until the roots protruded through the holes. During this time they are fed with Descanso plant food, one teaspoonful to the gallon of water; or they are fed modified cotton seed meal. Both of these nutrients are acid in reaction. I have observed that hibiscus do better in a pH 6.5 soil. Those near the rose bushes seem to grow faster than do those near the chrysanthemums. When we are ready to remove the rooted cutting from its can, we cut the can down along its side, and half way around the bottom. A small pair of shears is used to do this. When the sides of the can is spread open, the ball comes out intact. The present day cans are so thin that a little rusting makes them easy to cut. With a solid ball to set out, we obviate the danger of planting too deep.

Other standard rooting media are used, but we have a greater loss after they are set out. In cans, vermiculite remains too damp. We make a wooden frame and tack a piece of scrap copper screen wire to the bottom. This allows for good drainage.

In winter, we hasten the rooting by sinking the cans into a three or four inch bed of fresh horse manure placed in the bottom of the rooting frame. The chemical changes that take place in the manure, produce heat, and this bottom heat accelerates the root formation. Then again, after a few months, this manure is well rotted, and is ready for use in the garden.

Our newly potted cuttings are gradually subjected to sunlight until finally they enjoy the hottest weather and a full day's sun. They need frequent watering and well drained soil. Finally, after 8 to 10 months of watchful waiting and tender care, comes the pay off. We see a bud appear and watch it grow day by day until it bursts forth in all of its beauty. Our little cutting has its first bloom. It is a great satisfaction, and we feel that our efforts have been well rewarded.

REPORT OF SOUTHWEST REGION

PHILIP G. CORLISS, M.D., *Southwest Regional Vice President*
Somerton, Arizona

A joint meeting of the Southwest Regional group of the American Plant Life Society, the Bulb Society, and the Region #7 group of the Hemerocallis Society was held in Arcadia, California, on Saturday, May 26, 1951. More than one hundred members from the three societies gathered to enjoy the many features of the program.

The meeting began with a tour of the extensive exhibition gardens of Mr. Carl Milliken. Many named varieties of hemerocallis were in bloom. The visitors found their way to a large seedling bed, where one seedling in particular aroused much excitement on account of the brilliant striped throat resembling the rays of a glorious setting (or rising) sun.

More than twenty cars formed a caravan which drove the short distance down U. S. Highway #66 to the new Los Angeles County Arboretum, where Mr. Quinn Buck, regional director of The Hemerocallis Society, had moved his extensive daylily plantings. Although considerable interest was shown in other plants seen in the glasshouses, the highlight of this stop was to see the results of colchicine treatment of hemerocallis. Mr. Buck treats named varieties, and the best example of the polypoid growth resulting from the colchicine was in Dr. Stout's variety, SOUDAN.

The party next split into three sections. One group went to the daylily gardens of the Grahams in El Monte. Bloom was at peak here, the best shows being put on by vigorous rows of Russell's QUOTE ME and PURPLE WATERS.

The second group went to the 160 hilly acres in Monrovia that comprise the horticultural wonderland of Dr. Lux. The United States Department of Agriculture and other organizations have sent plant material from all over the world to Dr. Lux for this testing ground where frost is unknown. It has been estimated that there are more than 15,000 varieties of plant species growing in this amazing "garden." It covers a hillside, with terraced paths so steep it takes a good hiker to negotiate them. We were especially interested in the hundreds of *Amaryllis* seedlings blooming on the precipitous slopes. In his breeding, Dr. Lux seems to have come closer to pure rose shades than most hybridizers, and the members who were fortunate enough to see his hybrids were greatly excited and many begged pollen from huge flowers that caught their fancy. The wooded hills of Dr. Lux's "garden" might seem to the casual visitor to be not unlike any neighboring hills, but the botanist is thrilled to find that every flower, bush, or tree, is something unusual and generally unknown to him.

The remainder of the members gathered under the huge live oaks

at Mr. J. N. Giridlian's Oakhurst Gardens, where they were later joined by the rest of us for garden tours and picnic suppers. I shared the generous baskets brought by several of our members, notably Miss Charlotte Hoak, Horticultural Editor of Golden Gardens. Mr. Giridlian stoked up a portable barbecue wagon and distributed delicious frankfurters and rolls.

After dinner we enjoyed Kodachrome slides projected in the same oak grove. It grew rather chilly, and the barbecue wagon was moved around the grove, providing pleasant warmth.

Our thanks are extended to Mr. Giridlian and The Bulb Society for their hospitality; the meeting was thoroughly enjoyable and I think all of us benefiitted from it.

PLANT LIFE LIBRARY

FORESTRY IN FARM MANAGEMENT, by R. H. Westveld and Ralph H. Peck. 2nd ed. revised by R. H. Westveld. John Wiley & Sons, 440 4th Ave., New York, 16. 1951. pp. 340. Illus. $5.00.

This important contribution represents "thoroughly revised information on new equipment and techniques for managing farm forests and utilizing their products — with emphasis on the principles of timber growing." The fourteen chapters are devoted to forest trees in a balanced agriculture, the economic and biological basis of growing tree crops, improvement and perpetuation of farm forests, establishment of new farm forests, measuring values of farm-forest products, and volumes and growths of farm forests, making trees into wood products, marketing farm-forest products, best use of wood on farm, management for special products, how farm forests aid wildlife, farm-forest plans and records, and aids to owners of farm forests. The volume concludes with a valuable appendix and an index. This book is highly recommended.

INSECT CONTROL BY CHEMICALS, by A. W. A. Brown. John Wiley & Sons, 440 4th Ave., New York. 1951. pp. 817. Illus. $12.50.

This up-to-date reference book on the subject indicated is indispensable to all who are interested in the theory and practice of insect control.

In the introductory chapter the insecticides of the 20th century are characterized, and the following chapters are devoted to the chemistry of insecticides, and their toxicity to insects; the pharmacology of poisons for insects; equipment for the application of insecticides, including also application from aircraft; toxicity and hazards to man and domestic animals, and to plant growth; chemical control of insects feeding on plants, and those affecting man and animals; and finally, insecticides and the balance of animal populations.

This important book is highly recommended.

INTRODUCTION TO AGRICULTURAL BIOCHEMISTRY, by R. A. Dutcher, C. O. Jensen and P. M. Althouse. John Wiley & Sons. New York & London. 1951. pp. 502. Illus. $6.00.

This attractive text "has been written on the assumption that it will be suitable for students with sound training in inorganic and organic chemistry," and "that it will serve as a general reference book for students who are interested in the underlying chemical principles affecting plant and animal growth." Part 1 is concerned with general considerations. Part 2 is concerned with the essential biochemical processes during seed germination and subsequent plant growth. Part 3 is concerned with the use of plants as foods for animals, particularly, the biochemical processes of digestion, metabolism and growth. Modern dietary requirements of man and domestic animals are also considered in the discussions.

This important book is highly recommended.

ELEMENTS OF PLANT PROTECTION, by Louis Pyenson. John Wiley & Sons. 440 4th Ave., New York. 1951. pp. 538. Illus. $4.96.

This important, copiously illustrated work "brings together information on all plant pests—insects, disease-producing organisms, rodents, birds and weeds. It discusses their nature and control practices in a simple, concise fashion. Technical jargon has been eliminated whenever possible." It should appeal to both student and practical plantsman—farmer, horticulturist—as "interesting and informative reading and a valuable reference." It is very highly recommended.

THE MEASUREMENT OF LINKAGE IN HEREDITY, by K. Mather, 2nd ed. John Wiley & Sons. 440 4th Ave., New York 16. 1951. pp. 149. $1.75.

The objective of this valuable text is to bring to the notice of the geneticist the desirability of employing such refined statistical methods as are now in common use in such branches of biology as agronomic experimentation, and to provide the necessary instruction for their use. The subjects covered include two class segregations, information and the planning of experiments (I & II), the determination and estimation of linkage, combined estimation and testing heterogeneity, disturbed segregations, human genetics, the estimation of gene frequencies, and symbols and formulae. A brief bibliography and an index are also provided. This concise text will be a very valuable addition to the geneticist's library.

CYTOLOGICAL TECHNIQUE, by John R. Baker. 3rd. ed. John Wiley & Sons, 440 4th Ave., New York 16. 1950. pp. 221. Illus. $1.75.

This is an excellent brief presentation of the "principles and practice of methods used to determine the structure of the metazoan cell." In addition to the introduction there are chapters on general remarks on fixation, simple fixatives, fixing mixtures, microtomy, staining, mounting, methods for chromosomes, mitrochondria and the Golgi element, a bibliography and an index. This text is outstanding on account of the

author's facility in presenting background material dealing with the chemistry of mordanting, and staining. This concise handy reference volume is very highly recommended.

SOIL AND FRESHWATER NEMATODES, by T. Goodey. John Wiley & Sons, 440 4th Ave., New York. 1951. pp. 390. Illus. $7.00.

This up to date, comprehensive book by one of the world's authorities on nematology on the "free living nematodes found in nature in decaying plant tissues, in soil and humus, in fresh water habitats and sometimes in special association with insects" represents a land mark. It is apparently the only single book that summarizes the knowledge on this subject. It gives "a concise description of each genus considered and provides a clear, helpful illustration of each" and also gives facts of biological interest including food habits.

THE CHROMOSOMES, by M. J. D. White. 4th ed. John Wiley & Sons, New York. 1950. pp. 124. Illus. $1.50.

We welcome this 4th edition of Dr. White's well known concise text on chromosomes. The chapters of the book are devoted to (1) the resting nucleus, (2) the general outline of mitosis, (3) special problems of mitosis, (4) the general outline of meiosis, (5) special problems of meiosis, and (6) chromosomes and evolution. The book concludes with a glossary of terms, a bibliography and an index.

THE PLANT DOCTOR, by Cynthia Westcott. 3rd ed. J. B. Lippincott, E. Washington Sq., Phila. 1950. pp. 231. Illus. $3.00.

This is a revised edition of a well-known and much appreciated book on the control of the common garden enemies—"bacterial, fungous and virus diseases, physical injuries and those caused by environment and by chewing and sucking insects, nematodes and mites"

The first ten chapters are on a calendric basis for pest control in the Northeastern States, including pests common to other sections of the United States. Then follow chapters on troubles in the Middle West, Southeast, Southwest, California and the Northwest; an alphabetical miscellany, and an index.

This is an excellent popular book on the control of garden pests, and will have a wide appeal to the gardener.

GENETICS IN THE 20TH CENTURY, edited for the Genetics Society of America by L. C. Dunn. Macmillan Co. New York. 1951. pp. 634. $5.00.

This attractive volume is "a compilation of the invitation papers presented at the program of the Golden Jubilee of Genetics at Ohio State University, Columbus, Ohio, Sept. 11—14, 1950. . . . The primary purpose was to survey the progress of the first fifty years of genetics and to exemplify the status of some of its problems today." The 26 chapters cover the entire field of genetics by outstanding American and European authorities. This is a *must* work for all interested in genetics.

FOUNDATIONS OF BIOLOGY, by L. L. Woodruff and G. A. Baitsell. 7th ed., Macmillan Co., 60 Fifth Ave., New York. 1951. pp. 719. Illus. $5.50.

This 7th enlarged, profusely illustrated edition of an outstanding text on biology, prepared by Dr. Baitsell at the request of the late senior author, without doubt is among the best concise treatises on the subject. The 35 chapters dealing with plants and animals provide a stimulating survey course of the entire field of biology, including structure, physiology, genetics, evolution and classification. It is a text that the teacher, college student and others interested in the field will welcome. It is highly recommended to all readers of Plant Life.

TAXONOMY OF VASCULAR PLANTS, by George H. M. Lawrence. Macmillan Co., New York. 1951. pp. 823. Illus. $7.95.

We have long been waiting for just such a book, and this stimulating work will surely receive a warm reception. It is "an outgrowth of the author's experience as a research taxonomist and as a teacher." Dr. Lawrence breaks new ground in dividing his treatise into two parts. One part presents the "more academic and theoretical considerations of taxonomy, supplemented by explanatory chapters of the practical fundamentals found to be essential to a minimum working knowledge of the science." The second part consists of "a systematic enumeration of 264 families of vascular plants known to grow as indigens or exotics in North America." This second part is supplemented by "an appendix providing an illustrated glossary of the botanical terms used throughout the text."

This is undoubtedly the best text on the subject that has appeared up to the present, and is recommended to all who are interested in the taxonomy of vascular plants.

HAMMOND'S COMPLETE WORLD ATLAS, by C. S. Hammond & Co., New York. New 1950 Census Edition. New York. 1951. pp. 376. $5.00.

This attractive world atlas, only 6¾ by 9¾ inches in size, provides a handy reference volume that the plantsman may keep in an ordinary book shelf with other required reference books. The large-scale up-to-date double-spread maps in different colors represent a distinct achievement in atlas making. The volume also includes a glossary of geographical terms, an illustrated gazetteer of the United States and Territories, and an index of cities and towns of the world.

PLANT GROWTH SUBSTANCES, edited by Folke Skoog. University of Wisconsin Press, 811 State St., Madison, Wisc. 1951. pp. ——. Illus. $6.00.

This important volume is edited by one of the 40 contributors. The papers were presented at a symposium at the University of Wisconsin, Sept. 5—7, 1949, and include papers from most of the outstanding contemporary workers in the field of plant growth substances. The articles

are grouped under (1) plant growth substances, (2) growth substances in plant metabolism, (3) tissue responses to growth substances, (4) practical application, (5) growth substances in vegetative development, (6) growth substances in reproductive development, (7) growth substances in pathological growth, and (8) vitamins and amino acids as growth factors. This is an indispensable reference book for all interested in plant science research.

MINERAL NUTRITION OF PLANTS, edited by Emil Truog. Univ. of Wisc. Press, Madison, Wisc. 1951. pp. 469. Illus. $6.00.

This book is a compilation of 18 articles on mineral nutrition of plants by 22 authors from various research institutions of the United States, Hawaii and Sweden. It was edited by one of the contributors. The papers were presented at a symposium held at the University of Wisconsin. The articles are grouped under (1) mineral nutrition of plants, (2) physico-chemical and biological factors affecting nutrient availability in soils, (3) mechanism of entry and translocation of mineral nutrients in plants, (4) some field problems in plant nutrition, (5) role of minerals in plant nutrition, and (6) modifying influences of various environmental factors upon mineral nutrition.

These papers represent the "latest information, both theoretical and practical, associated with mineral nutrition of plants."

HOW TO LANDSCAPE YOUR GROUNDS, by Loyal R. Johnson. 2nd ed. A. T. de la Mare Co., 448 W. 37th St., New York. 1950. pp. 257. Illus. $3.50.

The first 16 chapters of this attractive book are concerned with the principles and practice of landscape gardening—planning before planting, locating the house, architectural features of the garden, walks, drives and entrances, lawns, trees and shrubs, flower gardens for gay color, rock gardens, wild gardens, soil improvement, select list of (1) shrubs, (2) acid soil plants, (3) trees, and (4) vines.

Chapter 17 is devoted to planting plans and keys for the various regions of the United States.

This valuable text is highly recommended.

PROBLEMS OF CYTOLOGY AND EVOLUTION IN THE PTERIDOPHYTA, by I. Manton. Cambridge Univ. Press, American Branch, 51 Madison Ave., New York. 1950 pp. 316. Illus. $8.50.

Written in beautiful English and with a minimum of scientific jargon, this authoritative work is without doubt one of the most outstanding contributions ever reported in the field of karyo-systematics and evolution. The thorough treatment, based on the foundation that "what cannot be photographed is not used as evidence," is bound to influence very greatly not only the thinking about the subject treated, but will also serve as an ideal toward which others will strive in the future. "She first surveys the growth of knowledge of evolution and heredity since Darwin and Mendel, and describes and illustrates a few particular ex-

amples to explain the methods followed and the essential concepts and technical terms to be used. . . . The main theme is a comparison between evolutionary processes as revealed by cytology in an ancient and a modern group of plants. For the modern group (*Cruciferae*) the author draws upon published work; but for the ancient group (*Pteridophyta*) this book is the sole authority." Dr. Manton's book is of first importance not only to the specialist in the field of the *Pteridophyta*, but also to the systematist and student of evolution. It is a book that is very highly recommended.—*H. P. Traub*

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 150.]

long as the perianth segments, the segments linear or lanceolate-linear, acute, reflexed; filaments filiform; anthers ovate; style filiform. Tropical Africa.

Haemanthus germarianus J. Braun & K. Schum., in Mitt. deut. Schutzgeb. 2: 145—146. 1889.—Bulb globose; leaves about 7, arising immediately from the rhizome at the same time as the flowers, long-petiolate, oblong, attenuate-acuminate, fleshy (but in drying thin-membranous, hyaline), attenuate into the petiole at the base, purple-speckled, the larger veins slender, the transverse veins oblique; peduncle elongate, unspotted, from the center of the bulb; umbel many-flowered, showy; spathes lanceolate, membranous, straight; pedicels long; divisions of the perigonium spreading, the tube ⅕ as long as the segments; stamens surpassing the perigonium. Cameroons.

Haemanthus kundianus J. Braun & K. Schum., in Mitt. deut. Schutzgeb. 2: 156. 1889. Bulb globose, stature of the preceding; leaves very long—petiolate, oblong, very obtuse, shortly attenuate into the petiole at the base, the larger veins slender, the veinlets oblique; umbel globose, pedunculate; flowers pedicellate; tube of the perigonium longer than the ovary, the segments twice as long as the tube; stamens greatly surpassing the perigonium. Cameroons.

Haemanthus leucanthus Miq., in Jour. Bot. Neerl. 1: 33—34. 1861. —Leaves two, somewhat longer than the scape, not sheathed, obovate-oblong or subspathulate, spreading-ciliate, fleshy-herbaceous, green; scape cylindric-compressed, whitish-greenish, glabrous; segments of the involucre 5, ovate or narrower, whitish, green-nerved, retrorsely ciliate except at the base and apex, equaling the larger stamens; umbel many-flowered, flowers subsessile; lobes of the white perigonium linear, connivent, tuberculate at the somewhat incurved apex, shorter than the stamens. Cape of Good Hope.

Haemanthus bequaertii De Wild., in Pl. Bequaert. 1: 44—45. 1921. —Herbaceous, bulbous, up to 2 cm. wide at the base; roots velutinous, to 4 mm. thick; leaves 2 or 3, petiolate, the petiole 18—23 mm. long, sheathing at the base, the blade elliptic, 12—13 cm. long and 5.5—8 cm. wide, with 7 or 8 non-furcate lateral veins, rounded at the base or

obtusely cuneate, short-acuminate at the apex; inflorescence lateral, the peduncle about 34 cm. long; umbel about 15-flowered, 12 cm. broad; flowers carmine-red, pedicellate, the pedicel 14—16 mm. long; tube of the perianth 12—13 mm. long, the segments linear, 1-nerved, 25—38 mm. long and 1 mm. wide; ovary subglobose, about 3 mm. broad; filaments about 30 cm. long. Belgian Congo.

Haemanthus radcliffei Rendle, Jour. Linn. Soc. Bot. 37: 223—224. 1905. Glabrous herb, from a thick root-bearing rhizome; leaves 3 or more, long-petiolate from a broadly sheathing base; petiole winged; blade oblong-elliptic, obtuse at the apex, gradually narrowed into the petiole at the base, papery in drying; veins regularly joined to the transverse veinlets, 6 conspicuous on each side; scape central, thick at the base, sheathed with short membranous leaves; involucral bracts scarious, greatly reflexed; umbel globose, about 20-flowered; pedicels longer than the bracts; tube of the perianth slender, cylindric, shorter than the segments, the segments linear-lanceolate, acute, spreading, . . . reflexed, rose, 5-nerved; filaments surpassing the segments. Rhizome 3 cm. long, 1.5 cm. thick; petiole about 20 cm. long, flattened, 5 mm thick, merging into the blade that is about 20 cm. long and 5 cm. wide; scape subequaling the petiole; bracts 2.5 cm. long; umbel about 13 cm. in diameter; pedicels about 3.5 cm. long; tube of the perianth 1.5 cm. long, about 1 mm. in diameter, the segments 3 cm. long, scarcely 5 mm. wide; filaments to 4 cm. long, anthers 1.5 mm. long.

Haemanthus cyrtanthiflorus C. H. Wright, Jour. Linn. Soc. Bot. 37: 529—530. 1906.—Differing from the remaining species of the genus in the broad oblong segments of the perianth which are much shorter than the tube. Bulb ovoid, drawn out into a long neck at the apex, furnished at the base with an obliquely descending rhizome 3 cm. in diameter; leaves elliptic, attenuate at the base and apex, at first minutely furfuraceous, finally glabrous, about 23 cm. long, 7.5 cm. wide, membranous, the lateral veins 7—10 on each side, inconspicuous; petiole about 18 cm. long; scape lateral, about 30 cm. long, glabrous, about 12-flowered; spathes membranous; pedicels 2.5 cm. long, slender; perianth red, the tube 3.8 cm. long, subcylindric, the lobes oblong, obtuse, cucullate at the apex, the exterior ones 12 mm. long and 4 mm. wide, slightly longer than the interior ones; stamens inserted in the throat of the corolla; filaments flattened, long-triangular, 6 mm. long; anthers 3 mm. long; ovary subglobose, 4 mm. long, glabrous; berry subglobose, 18 mm. in diameter, 2-seeded; seeds 10 mm. in diameter.

Haemanthus eetveldeanus De Wild., & Th. Dur., in Ann. Mus. Congo, Ser. II. i. I. 56. 1899.—Rhizome thick, perpendicular, compact, brown, white within; leaves 4, dark-green, long-petiolate, the petiole semi-terete, 16—22 cm. long, dilated at the base; blade ovate-elliptic, attenuate at the base and apex, 16-37 cm. long and 7—8 cm. broad; veins about 11—13 on each side; scape central, long-pedunculate, the peduncle about 34 cm. long; umbel many-flowered, about 12 cm. broad, globose,

the pedicels about 40 mm. long; perianth rose, the tube cylindric, 7—8 mm. long, the segments ovate-elliptic, 5-nerved, about 22 mm. long and about 7 mm. wide; filaments rose, 22—30 mm. long; anthers about 2 mm. long. Belgian Congo: Region III, in wet forests near Eloungou, November 1896 (Alf. Dewevre, collector).

Haemanthus cabrae De Wild. & Th. Dur., in Ann. Mus. Congo, Ser. II. i. 1. 56. 1899.—Rhizome thick, globose, 15—20 mm. broad, brown, white within; leaves 2 or 3, yellow-green, long-petiolate, the petiole semiterete, 10—13 [cm.] long, slightly dilated at the base; blade ovate-elliptic, attenuate at the base and apex, 10—16 cm. long and 3.5—6 cm. broad; veins 9 on each side; scape central, long-pedunculate, the peduncle about 25 cm. long; umbel many-flowered, about 11 cm. broad, globose, the pedicels 20—22 mm. long; perianth rose, the tube cylindric, 8—9 mm. long, the segments linear-elliptic, acute, 3—5-nerved, about 20 mm. long and 3 mm. wide; filaments rose, about 30 mm. long; anthers brown?, about 2 mm. long. Belgian Congo: Region V, south of Boma-Vonde, 1896 (Captain Cabra, collector).

Haemanthus (*Nerissa*) *cecilae* Baker, Kew Bull. 28. 1906.—Very close to *H. zambesiacum* Baker, differing in the longer tube of the perianth and the segments of the limb twice as long as the tube. Bulb large; leaves oblong, obtuse, attenuate at the base, membranous, glabrous, the primary veins 9 or 10 between the midrib and the margin, the intermediate veinlets close together, oblique; peduncle stout, lateral, conspicuously red-brown below, spotted; umbel globose, dense, 5—6 inches in diameter; valves of the spathe many, lanceolate, reflexed, 3—3.6 cm. long; pedicels 2.4—3 cm. long; perianth deep red, the tube cylindric, 8—9 mm. long, the segments of the limb linear, 1-nerved, twice as long as the tube, erect-spreading in the expanded flower; stamens slightly longer than the limb, the filaments red, the anthers oblong, small, loose.

Haemanthus (*Gyaxis*) *somaliensis* Baker, Kew Bull. 227. 1895.—Leaf-bearing stem shortly developed; leaves three, membranous, oblong, growing rapidly, often anastoming, cohering; scape elongate; bracts oblong, membranous, persistently ascending; pedicels elongate; tube of the perianth cylindric, the lobes subulate, ascending, equaling the tube in length; stamens longer than the lobes of the perianth; filaments filiform, reddish; anthers small, oblong, yellow, fruit globose, glabrous. Leaves appearing with the flowers, 6 inches long, 2 inches wide; scape 5—8 inches long; bracts 3 cm. long; corolla-tube 6—8 mm. long; filaments 1.8 cm. long; fruit about the size of a pea.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 172.]

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THE AMERICAN PLANT LIFE SOCIETY

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Box 2398, Stanford, California

THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

I. AMARYLLID COMMITTEE

For information about the AMERICAN AMARYLLIS SOCIETY, an integral branch of the AMERICAN PLANT LIFE SOCIETY, which functions as a comprehensive Committee for the advancement of the Amaryllids, see page 143.

II. OTHER COMMITTEES

GESNERIACEAE COMMITTEE—Dr. Kenneth H. Mosher, *Chairman*, *7215 Dayton Ave., Seattle 3, Washington*

Mr. E. Frederick Smith, *California* — Mr. Wyndham Hayward, *Florida*

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[Moldenke—AMARYYLID GENERA AND SPECIES, continued from page 168.]

Haemanthus longipes Engl., Bot. Jahrb. 7: 332. 1886.—Leaves lanceolate, plainly narrowed into a winged petiole half their length, acuminate, acute; peduncle shorter than the leaves, many-flowered; pedicels slender; segments of the perianth equaling the funnel-form tube, lanceolate; filaments narrowly linear, acute, mucronate; anthers linear; ovary obovoid, truncate; fruits cinnabar-red. Petiole 10—15 cm. long; leaf-blade 20—30 cm. long, 6—8 cm. wide, the midrib 5—6 mm. thick, recurved; peduncle about 20 cm. long, 6 mm. thick; pedicels 4.5 cm. long, ovary 2—3 mm. long; perianth hyacinth-colored, 2.5 cm. long, the segments about 1.2 cm. long, 3—4 mm. wide; filaments 2.5 mm. long, 1 mm. wide, adnate to the perianth-tube.

Haemanthus goetzei Harms, in Engl. Bot. Jahrb. 30: 276. 1902.—Bulb globose, thick; leaves not yet developed in our specimen; peduncle lateral, surrounded at the base by sordid-violet sheaths, erect, rather thick; bracts obovate or oblong or oblanceolate, sordid-violet; umbel many-flowered, dense; pedicels 2—3 times longer than the perianth-tube, the perianth-segments 2—4 times longer than the tube.

Anoiganthus gracilis Harms, Engl. Bot. Jahrb. 30: 276. 1902.—Corm oblong, narrowed at the apex into an elongate neck; leaves not yet plainly developed, linear; scape glabrous, bearing a 2-flowered umbel at the apex; bracts 2 at the base of the umbel, linear, erect or spreading with an acute sinus; one pedicel longer than the other; perianth-tube funnel-form, the segments 6, lanceolate, about equaling the tube; stamens 6, inserted at the margin of the tube; filaments short; anthers oblong, dorsifixed.

Haemanthus longitubus C. H. Wright, in Jour. Linn. Soc. Bot. 37: 114—115. 1905.—Related to *H. multiflora* Martyn, differing in the much longer tube of the perianth. Leaves elliptic, shortly and abruptly acuminate, thin-membranous, 6 inches long, 2½ inches wide; petiole 1¼ inches long; sheaths 3 inches long, spotted; peduncle lateral, 8 inches long, [umbel] many-flowered; spathes long-acuminate from an ovate base, red; pedicels slender, 12 mm. long; perianth red, the tube cylindric, slender, 2.8 cm. long, the segments linear, equaling the tube, 1—1.5 mm. broad, 1-nerved; stamens equaling the perianth-segments; ovary 3-lobed; ovules solitary.

Haemanthus cruentatus Schum. & Thonn., in Beschr. Pl. Guin. 168. 1827.—Leaves oblong-lanceolate-linguiform, subundulate, obtuse with a broad mucro, concave, completely glabrous, erect; umbel many-flowered, hemispheric; pedicels not articulated, longer than the involucre. Bulb tunicated, of the size of that of *Allium cepa*, conic-subglobose, white, sitting upon the bulb of the preceding year, this being cylindric, fleshy, solid, marked with annulate scars, bearing here and there unbranched

rootlets, removed beneath; leaves subbifarious, lanceolate, acute, subundulate, obtusely keeled, completely glabrous, erect, recurved as long as the scape, ending in a sheath at the base or linguiform, minutely undulate; leaf-sheaths forming a short, spotted pseudo-stem; scape a foot tall, obsoletely trigonous, completely glabrous, nude, marked with scattered confluent dark-purple spots; umbel hemispheric, many-flowered, blooming before the leaves appear; involucre spathaceous, polyphyllous, shorter than the umbel, reflexed, withering; pedicels an inch long, not articulated, mixed with very slender pieces [bracteoles] almost as long as the pedicels. Corolla superior, its tube half an inch long, cylindric, obsoletely hexagonal, erect, its limb horizontal, 6-parted, the segments narrowly linear, slightly longer than the tube; filaments 6, inserted in the mouth of the tube, opposite the segments of the limb, subulate, spreading, somewhat longer than the limb, scarlet; anthers oblong, incumbent; ovary ovate, green; style somewhat longer than the stamens, erect, scarlet; stigma simple, subacute; berry of the size of a large pea, subglobose, completely glabrous, scarlet, umbilicate with the rudiment of the corolla, 3-celled, one or the other locule often aborted; seeds solitary, convex, callous. Tropical Africa.

Haemanthus bivalvis G. Beck, in Paulitschke, Harrar. 542, fig. 1. 1888.—Scape strict, articulated beneath, closely plicate in drying, red-spotted beneath, 24 cm. tall; leaves not known; bracts very broad, 2-valved from the shortly connate base, glabrous; one valve ovate, acute, 35 mm. broad, the other 2-toothed and 23 mm. broad, both bluish in drying, equaling the perianth (excluding the filaments) in length; bracteoles subfiliform, subequaling the peduncles in length; peduncles 1—1.5 cm. long; perianth (rose?), the tube cylindric, 1 cm. long, the segments very narrowly linear, on the inner side marked with papillose warts below the apex, slightly longer than the tube; filaments narrowly linear, twice as long as the perianth; style filiform, slightly surpassing the stamens; stigma capitate; immature fruit subglobose.

Found on Mount Haqim near the city of Harrar. Related to *H. tenuiflorus* Herb., Bot. Mag. pl. 3870, and its variety *coccineus* Hook., Bot. Mag., pl. 5881, but distinguished by the form of the involucre, the longer filaments, shorter style, and the segments of the perianth being barbate-verrucose below the apex.

Sect. BRISEIS (Salisb.) Stearn, (*Allium*) in Herbertia 11(1944): 20. 1946.—Petals coalesced into a disk at the base, recurved, oblong, the inner ones narrower, connivent and scarious after anthesis; filaments inserted in 2 series above the base of the petals, subulate; pericarp turbinate; style 3-fid; stigmas 3, hemispheric; seeds arillate. The name is poetic, alluding to the drooping fruits.

Sect. MICROSCORDUM Maxim., (*Allium*) in Bull. l'Acad. Imp. Sci. St. Petersburg 31: 107—108. 1887.—Perigonium shortly infundibular borne on a pedicel with dilated disciform apex, delicately membranous, 6-segmented, the segments erect, 1-nerved, the inner ones nar-

rower and slightly smaller; stamens 6, of which the 3 epipetalous ones are anantherous and often more or less deficient; filaments adnate at the base, narrowly subulate, somewhat shorter than or half as long as the perigonium; anthers dorsifixed, introrse, small, broadly oval; ovary lying on a broad base, indistinctly 3-celled, the cells opposite to the inner segments of the perigonium, 2-ovulate; style 3-sulcate, divided into 3 oblong stigmas which are arcuate-spreading and papillose all around; capsule fleshy-parenchymatous, the mature capsule and seeds not known. Herbs of the size of one's hand, with an alliaceous odor; bulb the size of a pea, solitary, the outer coat brown, parallel-fibrous, the transverse fibrils likewise parallel, loosely connected to each other, the inner coat hyaline; the underground portion of the stem enclosed in a hyaline tubular sheath; leaves 1 or 2, radical, appearing as though contracted into an elongated petiole lanceolate-linear, acuminate, greatly surpassing the umbel; bracts as many as the flowers, hyaline, acute, slightly shorter than the flowers; flowers 1 or rarely 2, one borne on a very short, thick, included pedicel, the other if produced at all is subsessile.

Sect. MOLY Moench, (*Allium*) in Endl., Gen. Pl. 147. 1836.—Stamens all equal, filiform or subulate; ovary 3-celled.

Sect. OPHIOSCORDON Wallr. (*Allium*), in Endl., Gen. Pl. 147. 1836.—Stamens equal, subulate; ovary 1-celled.

Sect. CODONOPRASUM Reichenb. (*Allium*), in Endl., Gen. Pl. 147. 1836.—Stamens all equal, connate at the base, connected in a ring to the segments of the perigonium; ovary 3-celled.

Sect. SCHOENOPRASUM Kunth, (*Allium*), in Endl., Gen. Pl. 147. 1836. The alternate stamens tricuspidate, the middle tooth anther bearing; ovary 3-celled.

Hymenocallis Niederleinii Pax, Bot. Jahrb. 11: 326. 1890.—In the affinity of *H. pedalis* (Lodd.) Herb. Leaves narrowly oblong, acute, narrowed toward the base into a short winged petiole; flowers white; tube of the perigonium very long, narrowly cylindric, the segments very narrowly linear, much shorter than the tube, obtuse; paracorolla funnel-form; filaments arising from the margin of the paracorolla, filiform, *half as long as the perigonium*; anthers versatile, elongate; style filiform, greatly surpassing the stamens, almost equaling the perigonium; stigma capitate; ovary ovoid, beaked; ovules about 6 per locule.

Bulb unknown; leaves 28 cm. long, 5 cm. wide at the middle, narrowed to 1.5 cm. at the base; scape unknown; tube of the perigonium 15 cm. long, almost 3 mm. in diameter; the segments 9—10 cm. long, 2 mm. wide; paracorolla 2.5 cm. long; filaments 5 cm. long; anthers 2 cm. long or longer; style to 25 cm. long; ovary to 2 cm. long. Argentina.

Zephyranthes jujuyensis Holmb., Anal. Mus. Buenos Aires, ser. 3, 4: 523. 1905.—Bulb ovate-pyriform, tunics dark brown to black, 1.5—1.75 cm. in diameter, the neck 1 to 2 or 3 cm. long; leaves erect, rather

rigid, growing up after anthesis, often 3, rarely 2 or 5, opaque, green, becoming darkish-purplish at the base, the color disappearing toward the very bottom, slightly glaucescent, linear, curved-canaliculate, the upper fourth or fifth partly flattened, rather obtuse on the back, aristate in the middle, sometimes more or less falcate, rather narrowed toward the extremity, elliptic and rounded or rarely acutish at the apex, successively gradated in size, sometimes reaching 30 cm. in length, 6.5—7 mm. wide, the extreme half gradually narrowed to the base; scape green-glaucous, gradually rufescent from the middle upwards, transversely elliptic, 5—11.5 cm. long, 2.5 x 3.5 or 3.5 x 4.5 mm. in diameter, scarcely attenuate toward the apex; spathe dark brown or brown-violet or brown-purple, 3.5 cm. long, the basal half tubular, with the segments split to the middle, paler in drying; pedicel 1—2 cm. long, slightly narrower than the scape, greenish, lined with dark-brown, slightly declinate at the apex; perianth 6 cm. long and in full sunlight 7 cm. in diameter, the segments curvate-spreading extrorsely, the tube 5 mm. long, naked within, the segments coalesced at the base, lanceolate, slightly shell-shaped; sepals 6 cm. long, the uppermost 14 mm. wide at the middle, the 2 others 13 mm. wide; petals 5.5 cm. long, 11 mm. wide; the perianth finally white, the lobes greenish at the base within, marked with pale-gray narrow lines, outside the basal half or third more intensely green, fading out toward the margins and toward the apex, the sepals marked with narrow dark-brown, pale-brown, or brownish-violet lines (absent at the margins)—in one specimen the uppermost sepal is rather sordidly lilac-netted on the outside, in the 2 others more deeply so—green and mucronate at the apex, sometimes fuscous-violet at the very base; petals marked on the outside with narrow gray or somewhat darker lines and rose-netted at the apex; ovary greenish-brown, 7 mm. long, slightly thickened toward the apex, obpyramidal; stamens unequal, often tridynamous; filaments pale-green, paler toward the apex, free and arcuately geniculate in the throat, the longer ones 2.75 cm. long; immature anthers slender, 1 mm. in diameter, 12—13 mm. long, paler yellow; style 3—3.25 cm. long, very slightly declinate, whitish toward the apex, pale-green toward the base; stigma trifid, the segments arcuately spreading and 3.5 mm. long, the style with a linear sulcation [channel] leading to each sinus between the stigma-branches; capsule unknown.

Var. *volcanica*, with the perianth white, the basal third greenish, with the narrow lines obsolete or almost so, 5 cm. long, the scape 11.5 cm. long. Jujuy, Argentina.

Zephyranthes [*Euzephyranthes*] *lactea* S. Moore, Trans. Linn. Soc. Lond., ser. 2, 4: 495. 1895.—Bulb ovoid, densely covered with dark-brown tunics which are prolonged into a neck to 2 cm. beyond the bulb; leaves radical, elongate, narrowly linear, obtuse, produced at the time of anthesis; scape slender, rarely ampliate upwards; spathe oblong, 2—2.5 cm. long, bifid at the apex in the fashion of this genus; peduncle sometimes equaling the spathe, sometimes longer or shorter than it, slender; flowers medium-sized; tube of the perianth very short, the lobes

ovate-lanceolate, shortly acuminate, closely connate to each other and thus producing a false tube which is slightly and gradually ampliate at its apex to 0.5 cm.; stamens inserted very close to the base of the tube; three filaments flattened, borne opposite the interior segments of the perianth, equally long but longer than the other 3, the 3 shorter ones also equally long; stigma unequally trifid. It grows in open places at Jangada, Brazil, blooming in September (no. 283).

Bulb 1.5 cm. in diameter, 1 cm. long, the neck plainly 1—2 cm. long and 0.7—0.9 cm. in diameter; leaves radical, 8—14 cm. long, sometimes attenuate to the base, 0.2—0.3 cm. wide; spathe 6—16 cm. long to the spathe, very slightly ampliate beneath the spathe and thickened there after the flowers have fallen; spathe to 3 cm. long, rather lax, bifid to about 0.5 cm.; peduncle 2—5 cm. long, slender or thickened; flowers white; the flower in all 4.5 cm. long, scarcely 3 cm. in diameter; tube of the perianth 0.4 cm. long, with a small ring of small fringed scales; anthers narrowly linear, 1.2 cm. long; the shorter filaments 0.5 cm. long, the longer ones 2 cm. long; style 1.8—2.1 cm. long, its branches 0.15 cm. long.

It differs from *Z. cearensis* Baker in its larger white flowers, the scaly tube of the perianth, the unequal much larger stamens, etc. From Goyaz, in eastern Brazil.

Zephyranthes chrysantha Greenm. & Thompson, Ann. Missouri Bot. Gard. 1: 406. 1914.—Bulb subglobose, 2—2.5 cm. in diameter, clothed with brownish-nigrescent tunics, the neck 3—5 cm. long, 6—8 mm. in diameter; leaves 2—4, produced during anthesis, linear, 2.5—4.5 dm. long, 2—3 mm. wide, glabrous; scape 2—3 dm. tall, glabrous; spathe membranous, 2.5—3.5 cm. long, tubular below, the tube 1—1.5 cm. long, the lobe unilateral, lanceolate, 1.5—2 cm. long; pedicels 2.5—3.5 cm. long, slender; perianth infundibular, 3—3.5 cm. long, yellow, 6-lobed, its tube cylindric, about 5 mm. long, the lobes oblanceolate, 3—3.2 cm. long, 5—12 mm. wide, acute; stamens inserted at the apex of the perianth-tube, half as long as its segments; style shortly 3-lobed, subequaling the stamens; capsule depressed-globose, 10—12 mm. long and wide; seeds numerous, irregularly compressed, 5—6 mm. long, 2—5 mm. wide, blackened and often shiny. Texas.

Zephyranthes (*Pyrolirion*) *pseudocolchicum* Kraenzl. in Fedde, Repert. 13: 118. 1914.—Bulbs 4—5 cm. long 3—4 cm. thick narrowed into a neck which is to 3 cm. long; cataphylls hyaline, very thin, dry; permanent leaves absent during anthesis, one finds only rudimentary linear primordia of young ones among the cataphylls; flowers always single, borne directly upon the bulb, the ovary very shortly pedunculate or sessile; perigonium-tube slenderly cylindric, 8—9 cm. long, above that divided into 6 oblong-lanceolate, acute, slightly spreading segments, all 6 brick-red, quite intensely punctulate, 3 cm. long, 8—10 mm. wide; stamens equally long, the filaments narrowed from the broader base, about

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 182.]

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THE AMERICAN PLANT LIFE SOCIETY

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[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 176.]

1 cm. long, the anthers large; style very long, about equaling the perigonium, slightly surpassing the anthers; stigma capitate, manifestly trilobed, coarsely papillose. Flowers in November, Bolivia.

Zephyranthes stenopetala Baker, Kew Bull. 226. 1899; differs from the remaining species of the section *Euzephyranthes* in having linear perianth-segments.

Bulb globose, 1 inch in diameter, the exterior tunics membranaceous, brown; leaves erect, narrowly linear, glabrous; peduncle slender, fragile, 1-flowered, 8—9 inches long; spathe membranaceous, 30 mm. long, cylindric, bifid at the apex, the valves small, subulate; pedicel erect, 30—36 mm. long; perianth pale-red, 42 mm. long, the tube short, the segments of the limb linear; stamens one-third as long as the perianth; anthers small, linear-oblong; style 3-cuspidate; capsule oblong, 4 mm. long. Uruguay.

Zephyranthes longistyla Pax, Bot. Jahrb. 11: 323. 1889.—In the affinity of *Z. minima* Herb. Dwarf; leaves synanthous, filiform, equaling or surpassing the scape; spathe bifid almost to the middle; pedicel half as long as the spathe; flower erect, sulphur-yellow; perigonium medium-sized, the tube short, the segments elliptic or obovate, acute or mucronulate; [3] shorter filaments alternating with [3] longer filaments; style elongate, greatly surpassing the stamens, trifid; capsule small.

Bulb brown, ovate-oblong, 1.5—2 cm. in diameter; leaves slender, green, often irregularly spirally contracted when dry, 8—15 cm. long; scape slender, 5—8 cm. tall; spathe almost 2 cm. long, bifid to the middle, the segments very acuminate, hyaline, pale or almost rosy; flower shortly pedicellate, pedicel almost 1 cm. long, slender; segments of the perigonium 2—3 cm. long, almost 1 cm. wide; style 2 cm. long; capsule scarcely 5 mm. in diameter. Argentina.

Zephranthes (Euzephyranthes) viridilutea Kraenzl. in Fedde, Repert. 13: 118. 1914.—Bulbs globose, 4 cm. in diameter, attenuate into a neck 3 cm. long; leaves absent at time of anthesis; scape without the flower to 35 cm. tall, 1-flowered; spathe short, 2 cm. long, shiny, white; ovary sessile, the apex thicker than the base, 2 cm. long; the tube of the perigonium very short, scarcely 4 mm. long, the segments lanceolate, acuminate, 4.5 cm. long, 6 or 7 mm. wide, the sepals yellow-green (except for the margin) outside, yellow inside; petals yellow, marked with a green median line, slightly broader [than the sepals]; perigonial scales absent; stamens inserted slightly above the base of the perigonium; filaments about 1.3—1.5 cm. long; anthers contorted; style with the stigma 4 cm. long in all, the stigma itself about 1 cm. long, spatulate, greatly

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 35.]

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 98.]

capitate stigma included. Argentina.

Hippeastrum organense var. *compressum* Herb., Bot. Reg. Lond. 28: misc. p. 39. 1842.—Differing from *H. organense* in its larger bulb; leaves glaucous, scarcely an inch wide, subobtuse, erect; scape glaucous, more often 2-flowered; perianth laterally compressed (the vertical expansion 6½ inches, the lateral 4 inches), brick-red, with the veins more deeply colored, the star and rays between the veins green, the tube short, the calyptra almost obsolete, and the segments of the limb flat beneath, the upper sepal 2 inches wide. Observation: *H. aulicum* var. *glaucophyllum* of the Bot. Mag. has very little relation to *H. aulicum* and is perhaps better regarded as a variety of *H. organense*.

Zephyranthes lilacina Speg., Physis 3: 40. 1917.—*Zephyrites*, proterantherous, with the scape elevated, green; spathe narrow, deeply bifid, pink; flowers rather large, often solitary and more or less declinate, supported on a pedicel which is slightly longer than the spathe; tepals free almost to the base, the upper third beautifully and intensely lilac, the median third rose-colored and longitudinally white-striate, the lower third greenish, bearing at the very base obovate conspicuously fimbriate little scales; outer stamens ⅔ as long as the tepals, the inner ones ⅓ as long; filaments greenish-white; anthers yellow, horseshoe-shaped; ovary ovate; style whitish, slightly surpassing the larger stamens, trifid at the apex; stigmas revolute. Leaves and capsules unknown to me. Argentina. Found after rains in the meadows in the neighborhood of Posadas, Misiones, Argentina. January 1907.

Cooperia miradorensis Kraenzl. in Fedde, Repert. 121: 75. 1925.—Bulbs and leaves are lacking; scape with a single flower to 30 cm. tall, slender, smooth, completely naked; sheath 2-valved, hyaline, shiny pellucid, to 2.5 cm. long, the valves equally long, acuminate, indistinctly equaling the pedicels of the flowers; ovary globose or short-obovoid; tube of the perigonium very narrowly cylindric for 1.5 cm. of its length, later rather widened, toward the apex narrowly funnel-form, the free part of the segments oblong-lanceolate, acute, the entire perigonium (excepting the ovary) 4.5—5 cm. long, 1 cm. in diameter at its orifice. In fields at Mirador, Mexico (Liebmann 7925).

PLANT LIFE, VOL. 9, NO. 1, JANUARY, 1953

HERBERTIA

1953

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PLANT LIFE, VOL. 9, NO. 1, JANUARY, 1953

HERBERTIA

1953

SECOND NARCISSUS EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
26 E. Camino Real, Arcadia, California

THE AMERICAN PLANT LIFE SOCIETY

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[THE AMERICAN AMARYLLIS SOCIETY—continued on page 4.]

PREFACE

The *Narcissus* articles for this Second Narcissus Edition were assembled by the Narcissus Committee—Mr. Grant E. Mitsch, Chairman, and the other Committee Members. The Narcissus Committee is to be congratulated for an excellent job. The Committee has appropriately voted the 1953 Herbert Medal Award to Mr. E. A. Bowles, V. M. H., the eminent authority on *Narcissus* and the *Galantheae*. On account of the infirmities of advanced age, it has not been possible for Mr. Bowles to send in his autobiography in time for inclusion in this issue.

There is a wealth of *Narcissus* lore in this Second Narcissus Edition beginning with Mr. Wilson's interesting article on 40 years devoted to *Narcissus* breeding. The 1946 Herbert Medal was awarded to Mr. Wilson in recognition of his outstanding achievements in *Narcissus* breeding. Mr. Quinn contributes a thought provoking paper on miniature and decorative daffodils, naturalizing in the Washington, D. C. region, and a comprehensive beginners' list of daffodils, Mr. Hannibal writes about *Narcissus viridiflorus*, the green *Narcissus*, and other fall-flowering *Narcissus*, Mr. Powell, about his 30 years devoted to *Narcissus* breeding, Prof. Ballard, and Dr. Cooley, on *Narcissus*, Mr. Tuggle, on daffodils in Piedmont, Virginia, Mrs. Evans, on old naturalized *Narcissus* in the South, Mr. Mitsch, on daffodils in Oregon in 1952, and Mr. Johnson, on daffodils in northern California.

The other amaryllids, as usual, are not neglected in this issue. Mrs. Morton reports on the 1952 New Orleans Amaryllis Show, and the dedication of the New Orleans Amaryllis Garden, Mrs. Parks and Mrs. Slaughter, on amaryllid activities in Houston. Mr. Jones writes on Texas Rain Lilies, Mr. Manley, and Dr. Thornburgh on the evaluation of Hybrid *Amaryllis* Clones, Mr. Freeman, on *Allium tanguticum*, Mrs. Henry, on *Amaryllis belladonna* var. *barbata*, Mr. Saxon, and Prof. Ballard, on *Hemerocallis*, Mr. Chandler, on *Calostemma* in Australia, Mr. and Mrs. Orpet, on *Amaryllis immaculata*, Mr. Howard, on *Crinum scabrum*, Mr. Hayward, on *Lycoris*, Mr. Woelfle, on *Hymenocallis*, Mr. Burlingham, on *Amaryllis belladonna* in Florida, and Mr. Gilmer, on Krillium and *Hemerocallis* culture. There are descriptions of two new *Amaryllis* L., species, articles on the viability of seeds of white-flowering Hybrid *Amaryllis* clones, pot-culture of *Amaryllis belladonna* L., and others.

On account of increased work in connection with his fertilizer business, Mr. E. Frederick Smith has found it necessary to resign as your Membership-Secretary as of January 1 of the present year. Mr. Smith, a real plant enthusiast, served the Society faithfully and efficiently since 1945 and he will always be remembered for his role in getting the organization soundly established. We are sure that we voice the sentiment of the members also in expressing the gratitude of the Society to Mr. Smith for his outstanding accomplishments, and in wishing him every success in all his future undertakings. The members will be interested to know that Mr. Smith has agreed to serve the Society in the future with his counsel when needed.

The new Membership-Secretary is Miss Pauline Buck who has been interested in plants since childhood. Miss Buck is also an accomplished musician, holding the B.M. (Bachelor of Music) degree from Texas Wesleyan College, Ft. Worth, Texas.

The 1954 issue of Herbertia will be the SECOND HYBRID AMARYLLIS EDITION, and it will be dedicated to Mr. Thomas R. Manley who is a leader in the evaluation of Hybrid *Amaryllis* clones. A revision of the recognized *Amaryllis* flower types, the schedule of exhibition classes and score card will be included in addition to the other phases of Hybrid *Amaryllis* culture. As is customary, the other amaryllids will not be neglected in this issue. Articles for this issue are due by July 15, 1953, and should be sent in to the editor as soon as ready so as to assure early publication.

1531 Rodeo Road,
Arcadia, California,
January 5, 1953

Hamilton P. Traub
Harold N. Moldenke

[THE AMERICAN AMARYLLIS SOCIETY—continued from page 2.]

(c) REGISTRATION OF PLANT NAMES

Registrars: Dr. J. B. S. Norton, and Prof. W. R. Ballard.

Correspondence about the registration of plant names should be sent directly to Dr. Norton, *4922 40th Place, Hyattsville, Maryland*, and a self-addressed, stamped envelope should be enclosed if a reply is expected.

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FLOWER TYPES AND SCORE CARD FOR HYBRID AMARYLLIS

For classification of flower types and score card for Hybrid Amaryllis see PLANT LIFE *6*: 43-46. 1950.

[THE AMERICAN AMARYLLIS SOCIETY—continued on page 145.]

Dedicated to
E. A. Bowles

Hybrid *Narcissus*—EMPRESS OF IRELAND

Plate 1

SOME FAVOURITES AMONGST DAFFODILS I HAVE RAISED

GUY L. WILSON. *V. M. H., M. Agr.*,
Northern Ireland

I have just spent a few winter evenings in turning over the pages of the books in which I have kept a record of my Seedling Daffodils since they began to flower in the year 1912. It has been interesting to recall a few of those that appealed most strongly to me. Some of those from selections in those earlier years that got as far as being named and distributed have of course since been superseded and have disappeared from show benches and catalogues, partly to make way for newer and better ones, for few indeed that appear year by year from breeders gardens at our shows are destined for such lasting fame and popularity as the noble KING ALFRED or FORTUNE or BEERSHEBA.

Nothing that flowered in 1912 ever got named though I can remember that some of the flowers that did appear were good enough by then existing standards to be immensely encouraging, and sufficiently exciting to ensure that having put my hand to the plough of daffodil breeding I should never look back as long as health and opportunity made it possible to continue.

In the year 1913 two flowers appeared which in due course were named—the first, No. 2/25 was a seedling from the old bicolor trumpet Grandee which was itself a plant of very distinct character: what the pollen parent of this seedling was I do not know, but No. 2/25 was a uniform soft yellow throughout with a remarkably fine broad flat smooth perianth of great substance standing at right angles to the rather slender trumpet—it was subsequently named Darius—but like its parent its stem was too short. I have always had a special love for white daffodils, particularly white trumpets, and so was immensely delighted by a seedling, No. 2/30, which came in a small batch from MADAME DE GRAAFF by pollen of a white trumpet named LOLAII bred by the late Ernest Crosfield. This was for those days a large white trumpet of fine form, as its wide spread perianth had firm texture and stood well out from the long gracefully flanged trumpet;—moreover it was very much whiter than MME. DE GRAAFF and seemed an advance on any white trumpets that I had seen—so in due course it was named WHITE DAME, and some bulbs were distributed;—but its stem was too short—a fault common to white trumpets of those days—and its texture though firm was rather ribby; it was soon superseded.

In the next season, 1941, amongst a fair sized batch of seedlings from MME. DE GRAAFF by KING ALFRED pollen, one appeared that was quite distinct from all the others, a beautiful flower of first rate exhibition quality, it was a quite large trumpet of exceptionally smooth waxy tex-

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ture and clear soft rather lemon yellow self colour—it was a well balanced flower with a smooth flat perianth; and was a vigorous plant with distinct broad smooth foliage and fine large smooth bulbs, but unfortunately its stem was quite short. However, I named it HONEY BOY, and for some years it was a valuable exhibition flower and got fairly widely distributed, giving a good account of itself at shows in New Zealand.

I knew that a fine race of beautiful and vigorous varieties known in those days as "Giant Leedsii" had been produced from the old Leedsii MINNIE HUME by pollen of MME. DE GRAAFF and WEARDALE PERFECTION —so I had been making some crosses on MINNIE HUME, and it was also in 1914 that I flowered a few seedlings from this old variety by pollen of PEARL OF KENT, a large but short stemmed white trumpet bred by the late Rev. G. P. Haydon of Canterbury which caused something of a sensation when it appeared. One of these seedlings which I subsequently named IRISH PEARL was really about the best plant of its type that I had seen, as it was a large bold flower of beautiful form with broad flat perianth and frilled crown—it was, moreover, a most vigorous exceptionally free flowering and fast increasing plant. I subsequently disposed of the stock and in time lost trace of it, though I should not be surprised if it is still in circulation, as it was an excellent garden plant.

It must have been in either 1913 or 1914 that I flowered a few seedlings from Hispanicus Maximus and from amongst them one was kept though for some reason not numbered or recorded at the time; so far as I remember it improved considerably when grown on for a few seasons and was temporarily nicknamed "Max Orange," subsequently christened GOLDBEATER—and it is interesting because it turned out to be the first seedling of my own raising that I have continued to grow and distribute up to the present time—I am sure that it came from self-fertilized seed of Pyrenean Maximus—it is like a larger and bolder and much more vigorous Maximus of deepest intense self gold, a very durable flower of entirely decorative type, carried on a tall strong stem that makes a splendid garden plant.

Nothing of particular note seems to have appeared until the year 1917 when a late and most charming and dainty flower turned up—its seed parent was an old type Leedsii named MISS WEISS, raised by William Baylor Hartland of Cork, while its pollen parent was a large poeticus seedling of Mr. Engleheart's raising. Its perianth was just off white, while its almost flat saucer eye had a white ground shading to a cool apple-green centre and having a well defined narrow rim of soft clear pinkish orange. It proved to be a good doer and increased. I think it was next season that I sent a flower of it to Mr. Engleheart to see. I heard nothing from him for a longish time, and began to think that he had taken exception to my having used pollen from a flower that he had left on his stand at the close of a show—but in the end a delightful note came from the great man saying that he saw from his notes that I had sent him a flower af a "Hybrid Leedsii" like some he had raised but *better than any of them*. Need I say that I "wouldn't have called the

Hybrid *Narcissus*—CANTATRICE

Plate 2

King my uncle''! So my flower was named Mystic, and travelled far and wide. I still grow a row of it though I no longer distribute it.

Seedlings were of course flowering in increasing numbers year by year and I suppose I was getting harder to please, but so far as memory and my notes carry me, no outstanding landmarks seem to have appeared during the next eleven years—incidentally, readers might note that, and realize that it is not surprising that a high price per bulb is sometimes asked for a really outstanding novelty when it is first introduced and there are as yet very few bulbs in existence.

In 1928 however there appeared what I still think one of the best and most perfect little flowers I have ever raised, namely Cushendall. Its seed parent was a small pure white green eyed flower called Emerald Eye raised by Mr. Engleheart, and its pollen parent Mr. Engleheart's fine late Poeticus, Dactyl. Emerald Eye was a lovely little flower when it opened properly, and was first listed at the for those days high price of £30, about $85.00 per bulb—it was given me by my most generous of all Daffodil friends, the Brodie of Brodie. Unfortunately it had a poor constitution and often did not open its flowers perfectly, as is sometimes the case with these late small-crowned things, so I was fortunate indeed in getting it to seed to Dactyl, for Cushendall is a much stronger plant and its flowers always open perfectly here. It is a flower of faultless form, quality and substance, with broad nearly circular snow-white perianth, its small crown having a cream coloured fringe while the centre is wholly moss-green. So it was easily much the best green-eyed white flower that had appeared anywhere up to that time, and has been enthusiastically loved and admired by all who see it. To see its flowers in their full beauty, it must be cut and brought indoors as the buds are just bursting, as the strong sunshine at the late end of the season quickly fades out the green colouring. As soon as I saw what a jewel I had got, I repeated the cross which had given it to me, and sowed another batch of seed, but more of that anon. Another very good flower of 1928 was Dunlewey, which was also bred between two flowers of Mr. Englehearts raising, namely Mitylene seed by Kantara pollen, the latter being a very large rather short stemmed white trumpet. Dunlewey is a large white and cream Leedsii or 11-c which in a sunny climate would bleach to white throughout—it has good form and quality and has been a useful show flower in spite of its too short stem. It is one of the most vigorous, fast increasing and immensely free flowering varieties that I know, and makes a superb garden plant—its rather short stem becoming a virtue saving it from getting broken off by wind.

It has been truly said by such great breeders as Engleheart and P. D. Williams that it is more difficult to raise a good yellow trumpet of good constitution than any other variety of daffodil. In my early days I probably made more extensive use of King Alfred as a parent both for seed and pollen than any other variety, and yet with the exception of one or two fairly good ones, which I have since parted with, bred from Monarch by King Alfred I can recall nothing of note. It was around the year 1927 or 1928 however that I flowered Principal which

Hybrid *Narcissus*—FRIGID

Plate 3

was bred from CLEOPATRA by SORLEY BOY, the latter a yellow trumpet of fine form and substance, of unknown parentage, that appeared in a bed of mixed seedlings—PRINCIPAL, which is a flower of excellent form and habit and has a good stem, proved a good doer and in due course was awarded a First Class Certificate, and has been widely distributed.

In 1929 a batch of seedlings from the well known and beautiful MRS. E. H. KRELAGE by pollen of BEERSHEBA flowered. I still grow two of these: ARDCLINIS, the earlier, is a pure white flower of beautiful form and proportion that has done well in many places. The second one, SAMITE is later and taller and is a milk white flower of thick smooth velvety texture, beautiful form and quality and good length of stem—I think it likely that it came from a self-fertilized seed of MRS. KRELAGE as I can see no trace of BEERSHEBA in its appearance or character. When I had sufficient flowers of it, it gained a First Class Certificate. I have always thought highly of it on account of its exceptional quality, and it has proved of some value in breeding.

In the following season, 1930, one of the most important flowers I have raised made its first appearance: this was KANCHENJUNGA: its seed parent was an unnamed flower bred by Brodie of Brodie from WHITE KNIGHT by CONQUEROR, and its pollen parent was Brodie's magnificent ASKELON. In my note at the time of its flowering I wrote:—

> "A marvellous flower whose unfortunate fault is lack of sufficient substance"—

a criticism that I soon retracted, because as it developed in the next few seasons it soon came with abundant substance. It was a spectacular advance in size in white or near white trumpets, and I had not hitherto seen a flower in which such a very fine large widely flanged or bell-mouthed trumpet was so adequately balanced by a great perianth of immensely broad segments. Instead of lack of substance its fault is that, particularly on two-year-down plants a proportion of its flowers come with a cockled petal, but the perfect ones are a noble sight. Fortunately it is a first rate doer and increases freely. Its chief value however is as a parent: it transmits its great breadth of petal and has produced a number of large or very large flowers of better quality than itself. TROSTAN a fine tall pale bicolor trumpet was another find of the 1930 season. I had marked it the previous season without giving it a number or recording its parentage in my book—I had evidently not thought it outstanding so merely put a small wooden label against it with the word "Keep" so that I could save it for another chance when digging up the seedling beds, so it was re-planted, and in spring 1930 it flowered again as a really very fine large pale bicolor trumpet on a 2-foot stem, quite outstanding for those days—I have always felt pretty certain that it was bred from KING ALFRED by ASKELON—at all events its vigour and fine length of stem were to prove of much value in subsequent breeding.

The fifth seedling that I selected quite early in season 1936 was ZERO. This came from a short stemmed sturdy growing rather rough pure white trumpet or trumpet-Leedsii seedling, by pollen of Engle-

Hybrid *Narcissus*—FORESIGHT

Plate 4

heart's NAXOS, a very tall stemmed large crowned Leedsii of distinct character, which though now superseded as a flower, proved a most valuable breeding plant in helping to produce tall stemmed pure whites of fine quality. Curiously enough, though not itself an ice white, it had the faculty of giving green bases and great purity to a proportion of its progeny. ZERO, though many of its flowers are rather too rough for highest exhibition quality, is a spectacular flower on account of its great size and uniform icy whiteness—at its best it is a lovely flower as it has beautiful form and proportion its great spreading perianth standing away at right angles to the graceful somewhat slender and vase shaped crown which is almost of trumpet proportion, the perianth tube is deep green and the flower is short necked and well carried on a strong stem of adequate length—it is much admired and has been received with great acclaim in Japan. This same year also saw the birth of the white trumpet CANTATRICE [Plate 2] which many regard as one of the best things I have raised. It has great beauty and refinement of form, while its texture is quite unsurpassed having the smoothness of marble or polished ivory—it is a pure self white, and about the only improvement one could imagine would be to get a shade of that enchanting cold sea-green into the base of its trumpet. Anyhow in the Royal Horticultural Society's annual Daffodil Ballot which is conducted amongst the highest ranking exhibitors and growers only, it has now for seven successive seasons been voted the leading exhibition white trumpet—so I think it can be regarded as a really great daffodil.

TRUTH was one of the most beautiful flowers that came in 1933. It came from NAXOS seed by pollen of a short stemmed white trumpet seedling of unusual substance. It is a lovely and refined smooth pure white flower of beautiful form and finish carried on a very fine stem, not quite so large as ZERO and not quite so green in the base but rather better in texture.

It must have been in April 1931, the year after they were both selected, that I crossed a flower of TROSTAN with pollen of KANCHENJUNGA and got a very few seeds—from these, so far as I remember, only three plants grew—one of these outstripped the other two, and it was with increasing excitement that in the spring of 1936 I watched the development of an immense and tall stemmed bud. The largest daffodil bud I had ever seen—excitement rose to fever heat as a truly majestic flower began to open and display an immense and noble gracefully flanged and frilled long trumpet amply backed and balanced by a huge perianth. It was not fully out when I was due to leave for the London Show, and I hesitated much whether to cut it and take it with me, or leave it on the plant to develop and help me win the White Daffodil trophy at the Midland Daffodil Society's show the following week. I finally decided on the latter course, tied the flower to a supporting stake and covered it with a tall tubular glass "light," a few of which I had made for protecting special flowers. When I got home from London I found one of those horrible re-visitations of winter from which our fickle springs frequently suffer—there had been a hard frost, followed

Hybrid *Narcissus*—CHUNGKING

Plate 5

in the morning by violent hail, some of which still lay about. My heart sank, but I thought "At any rate that great flower will be safe under it cover;" but when I reached the plot where it was growing, I could no suppress a cry of dismay as I saw that the flower had been completely bent over by the frost and was hanging head downwards inside the "light" with its stem apparently broken where it had been tied. However closer examination revealed that the stem had not been broken—so although recovery seemed scarcely possible, we tied it up carefully with several supporting tieings and in due course the sap flowed again and the stem became as strong as though nothing had happened and the great flower developed to its full size and stature and went to the Midland Show where it created a sensation as it was of a size and height with a stem over 2-feet, hitherto undreamed of in a white daffodil. The evening of the second day when the show closed, I went to stay with friends at Presteign, taking the flower with me, and the following day it accompanied us, still fresh and perfect, to the Hereford Daffodil Show to astonish visitors there! And that is the story of the birth and début of Broughshane! Well, I have raised other daffodils that I love better, but I doubt if any gave me more exciting thrills in its early days. It grows with immense vigour and has, with its length of stem, size and fine constitution been of great importance in breeding. I have been mating it with smaller pure ice-whites of good habit and am getting some grand large flowers of ample stature, better quality and habit. It has of course had many triumphs at shows both here and overseas.

Earlier in these notes I said that when I saw what a perfect gem I had got in my dear little Cushendall, I repeated the cross between Emerald Eye and Poeticus Dactyl, which had given it to me, and sowed another batch of seed. These flowered in 1936 and the best one of the lot was in due course named Frigid. [Plate 3] It undoubtedly is one of the loveliest things that I have ever seen—an enthusiastic Japanese correspondent went so far as to call it the most beautiful bulbous flower he had ever seen. It is very late, later than Cushendall, so late that I was able to show it at the Royal Horticultural Society's Chelsea Show in late May where it was awarded a First Class Certificate. It is larger than Cushendall and whiter, being absolute ice-white throughout both perianth and crown except for a touch of vivid emerald in the eye—to see that at its best you must cut it as it is bursting and let it develop in a cool shady room—its broad perianth is rather more pointed than that of Cushendall—it is a more vigorous grower and is very free flowering, the flowers being perfectly posed on tall stiff stems which carry them well above the foliage. It comes like a celestial benediction, along with Poeticus Recurvus and the dear old double white "gardenia-flowered" poeticus right at the very end of the season. It flowers better on two year down established plants, and like the Poets probably will do best in the cooler and moister climates. It is of course far too late to compete at Daffodil Shows—it is just something to love in the peace of your own garden and the quiet of your own home.

In contrast with the lateness of Frigid the next season, 1937, brought me Foresight [Plate 4], which is the earliest flower of any

Hybrid *Narcissus*—PREAMBLE

Plate 6

consequence that I have raised, and one that I greatly like. It came, I believe, from self-fertilised seed of BONYTHON, the late P. D. Williams' fine early bicolor trumpet. Relative earliness or lateness of individual varieties varies a good deal in differing climates. Here at any rate, however, FORESIGHT is ten days earlier than FORTUNE, it is a beautiful bicolor trumpet of perfect form and balance; a very fast increaser and extraordinarily free flowering—its fault is that the stem is rather short, but in spite of that I think that its extreme earliness will make it a valuable market flower, especially as it forces easily and also makes a perfectly beautiful pot plant, grown out of doors its perianth is cream white, but indoors it comes pure white.

Later in that same season I flowered several very good vivid orange scarlet and yellow 111-a seedlings from MARKET MERRY, by pollen of a smallish brilliant orange scarlet and yellow flower named CLACKRATTLE that I had brought from Mr. P. D. Williams' garden in CORNWALL when paying him a visit. One of these, afterwards named CHUNGKING [Plate 5] turned out to be the best of the batch. It is a fine flower of good size with broad circular rich golden perianth and well proportioned intense deep vivid orange red shallow crown; it is a most vigorous plant and extraordinarily rapid increaser. Like CANTATRICE the Royal Horticultural Society's panel of daffodil experts have for the past seven successive seasons placed it as the best exhibition 111-a.

The third and probably most important notable flower that appeared in 1937 was CHINESE WHITE which also owes its existence to pollen of a flower that was sent me from Mr. P. D. Williams' garden—this time a beautiful SILVER COIN seedling, which I used on the flat crowned New Zealand raised variety SILVER PLANE. CHINESE WHITE is now fairly well known as it has had much success at Shows both in Britain and overseas—it is a big well proportioned circular shallow-crowned pure white 111-c of first class quality and has also for the past seven successive seasons been placed at the top of its class as a show flower by the R. H. S. daffodil ballot. Personally I consider FRIGID when well grown to be a more exquisitely beautiful flower, but it is so late that it never appears in competitive classes at shows.

It was in the year 1938 that my bicolor trumpet PREAMBLE [Plate 6] first flowered as a very neat and most perfect smallish early bicolor trumpet. It must have been 5 or 6 years after that first flower that it seemed suddenly to grow up and reveal itself as a full sized or even large flower of absolutely superlative quality, faultless perfection and beauty. It was bred from seed of Mr. P. D. Williams' beautiful and very perfectly formed 11-c NIPHETOS, by pollen of KANCHENJUNGA. It has perfectly smooth and flat pure white perianth and rich chrome yellow trumpet of ideal finish and proportion. After a few days this colour passes to a more lemon tone, but the flower remains a distinct bicolor till the end of its life. It is exceptionally durable, I have more than once been able to exhibit it at three successive shows; and it is so consistent in high quality that practically every bloom would be fit for exhibition. It is perfectly posed with a short neck on a good sturdy stem, and flowers

very freely. Few flowers give me such unalloyed delight and complete satisfaction. I consider it one of the very best things I have raised.

1938 was also the birth year of MILANION which I think one of my best yellow trumpets. It came from ROYALIST by pollen of a seedling, and is a clear medium yellow flower of ideal form balance and quality, well posed on an excellent stem—it is extremely free of increase and bloom.

I have had quite a few of the intrigueing and often charming pinky crowned flowers amongst my seedlings. INTERIM, one of the most interesting of these turned up in 1939. It was bred from a small dainty 111-c named CUSHLAKE, by pollen of a tall well formed 11-c named Dava, and is a fine vigorous plant making a large strong bulb and sending up a tall strong stem. The flower is more of decorative than show type, with clear white very slightly reflexing perianth, the petals slightly incurved at their edges while the neat cup is pale citron primrose with a band of salmon pink at the edge. It is proving an interesting parent and has given several seedlings with cups of definitely better pink colouring than its own.

No further outstanding landmarks came to light till 1942 when a considerable batch of seedlings flowered which had been bred from a yellow trumpet named KING OF THE NORTH, raised by Brodie of Brodie, by pollen of P. D. Williams' striking and beautiful very pale lemon CONTENT. Breeders had for long been trying to produce deep Maximus gold trumpets like KING ALFRED or deeper, as distinct from the softer and less brilliant yellow of the once popular EMPEROR. I remember that the late Walter T. Ware had pointed this out to me many years ago, and I had heard that a nice cool lemon trumpet had been bred from KING OF THE NORTH by Brodie's cream trumpet NEVIS—so I thought I would try CONTENT instead of NEVIS. It was a lucky cross and gave me quite a batch of beautiful large very cool and clear limey or almost greenish lemons to choose from: they really were quite a new colour break, in their way as exciting as the pinks. The most strikingly coloured is the one I have named SPELLBINDER which is a very clear bright limey lemon self on first opening, the inside of its trumpet gradually passes to almost white giving the effect of a reversed bicolor—hence it is classed as belonging to division 1-d though the trumpet retains at the very edge of its fringe a sparkling rim of lemon. Another of this family is MOONSTRUCK [Plate 7], a real giant of truly heroic dimensions and yet not at all coarse as its texture is good, and its form and proportion perfect, also it is beautifully posed with a short neck on a tall strong stem. These varieties flower quite early in the season and when exhibited in the trade groups they make a most telling and distinct feature and attract much admiration. I hear from Mr. Grant E. Mitsch of Canby, Oregon that he has also bred some very fine flowers from the same cross.

In the following season a most lovely little late-flowering jewel came amongst seedlings from CUSHLAKE in division 111-b. It has slightly reflexing and waved clearest pure white perianth and a small shallow crown of cool viridian or almost sea green shading paler towards the rim

which is sharply edged by a narrow band of vivid salmon orange. It has a nice wiry stem, and is altogether charming if cut young as it opens and brought indoors. Its name is LOUGH AREEMA, after a little fairy lake, up in hills above the County Antrim Coast.

In 1946, amongst other red cups there came a very nice neat rather early smallish flower with clear bright yellow perianth and vivid orange red cup—I gave it a number but cannot have paid very much attention to it amongst a host of others till the past season when I discovered that it is completely and absolutely sunproof—it was fully out before I left home for the London Show and though there were six days of the most brilliant sunshine of the season, and it was quite unprotected during my absence, when I came home I found it looking better than ever, and without the slightest trace of fading. This was a gratifying discovery, as I had made the cross from which it came in the hope of getting sunproof colour. Its seed parent was a flower bred between one I called SUNPROOF ORANGE by pollen of TREVISKY, while its pollen parent was RUSTOM PASHA. SUNPROOF ORANGE, which I no longer grow, was a vigorous fast increasing but not very free flowering 11-a with a bright yellow perianth and a cup that opened only slightly orange but deepened to tangerine with exposure. TREVISKY has very bright colour which holds better than some, while RUSTOM PASHA opens with a somewhat greenish orange cup which the sun develops to a rich tangerine red that is practically sunproof.

In 1947 several fine flowers came from a smallish batch of seedlings bred from GUARDIAN by KANCHENJUNGA. Now GUARDIAN is bred from P. D. Williams' high quality 11-c NIPHETOS by pollen of the tall vigorous pale bicolor trumpet TROSTAN—it is a flower of excellent quality and fine substance with broad smooth white perianth, and very faint lemon almost white crown of nearly trumpet measurement—it is moreover a very vigorous plant of splendid habit carrying its flowers which are short necked, on strong stiff stems well above the sturdy upright foliage. Amongst its seedlings from KANCHENJUNGA pollen one was obviously outstanding even at its first flowering: a very large white trumpet of ideal form and proportion, short necked and perfectly posed on a fine strong stem. It has improved considerably since first flowering and a bloom that I exhibited at the London Show in April 1952 was judged to be the best flower shown in the competitive classes: a glorious and majestic great white trumpet of quite faultless balance, proportion, and perfectly beautiful form with immense very broad flat smooth perianth, the great major segments being of the ideal ace of spades shape, while the smooth perfectly balanced trumpet has a beautifully finished flange. It probably owes the beautiful form of its perianth in part to its grandparent NIPHETOS. I think it is perhaps the finest big white trumpet I have seen up-to-date, and have named it EMPRESS OF IRELAND [Plate 1]: so I hope it will maintain its good character. Unfortunately a daffodil fly took toll of it, so there are as yet very few bulbs.

[Wilson—FAVOURITE DAFFODILS, continued on page 26.]

Hybrid *Narcissus*—MOONSTRUCK

Plate 7

Ceremonies at the dedication of the New Orleans Garden Circle Amaryllis Garden which was designated as an Official American Amaryllis Society Garden, with American Plant Life Society affiliations. From left to right, Mrs. M. B. Carlier, Mrs. Virginia Causse, Mrs. E. L. Jones, Jr., Mrs. Henry Isaac, Mrs. Chris Pervel, Mrs. Albert Georgi, the Hon. Victor Schiro,, Mrs. Leonce Ancoin, Mrs. W. D. Morton, Jr., Mrs. M. M. Sanchez, and Mrs. George Vanderveer.

Plate 8

1. REGIONAL ACTIVITY AND EXHIBITIONS

NEW ORLEANS AMARYLLIS GARDEN

New Orleans now has another beauty spot—a municipal Amaryllis Garden. It is located in the heart of the City on Loyola Street, between Tulane Avenue and Gravier Street. It is directly in front of the future eight and a half million dollar City Hall. It was dedicated August as the Garden Circle Amaryllis Garden by the Hon. Victor Schiro, Commissioner of public Buildings and Parks. It was designated as an Official American Amaryllis Society Garden, with American Plant Life Society affiliations (Plate 8).

Commissioner Schiro presented Mrs. W. D. Morton, Jr. (past President of the Garden Circle and Chairman of the Official Amaryllis Show for the past four years) with a Gold Key to the City for her excellent work in creating widespread interest in Amaryllis, and in putting on outstanding shows for the past four years.

Commissioner Schiro was made an honorary member of the Garden Circle and was presented with a silver ash tray. Mrs. M. M. Sanchez, President of the Garden Circle was given well-deserved praise for the Club's activities.

NEW ORLEANS SCHOOL AMARYLLIS GARDENS

Mrs. Morton writes under date of January 30, 1953 that the Garden Circle of New Orleans has established Amaryllis Gardens in McMain Junior High School and the Rabourn School, and plans have been made to organize more of these in other New Orleans schools as opportunity offers.

GARDEN CLUB OF HOUSTON BULB MART

Mrs. J. Willis Slaughter, *Hort. Chairman,*
Garden Club of Houston

Our Garden Club of Houston's civic project, The Mart, is staged annually, and the proceeds are for the planting and year-round maintenance of the grounds of the Houston Museum of Fine Arts.

When my husband was called to Rice Institute to head the Department of Sociology in 1919, I arrived on the Gulf Coast with all my crates

of beloved bulbs transported from our place on the Hudson River, with high hopes for their future in this semi-tropical climate. Within eighteen months most of my darlings had given up the fight and I set myself to find by experimentation just what bulbous plants could survive and prosper here.

In 1943, as President I asked the Club's Board to finance a Bulb Sale—the results of my long test in my own garden. The growing of bearded iris proved hopeless because of our high humidity, so I turned to the beardless types. It appears that the only bulbs grown in this region at the time of my advent were *Iris germanica* var. *florentina* Dykes, *Lycoris radiata*, Creole Easter Liliums, tuberoses, *Hemerocallis flava* and the lovely old Crinums known as the Milk and Wine Lilies.

As amateurs we have never bought at wholesale, but gradually, with support of such mentors as Cecil Houdyshel (Calif.), Giridlian (Calif.), E. O. Orpet (Calif.) and Wyndham Hayward of Florida, our horizons broadened each season, and this past year we made a net profit of over $2800.00 in our three day sale, held the first week in November under a huge marquee on the grounds of the Museum. We have become a tradition for the garden-minded in this region—have an established clientele—and usually I have orders in advance on the books of from $1200 to $1800 in value before the Mart opens. I think we may say that my great satisfaction is that our efforts have been educational, and have literally transformed the planting scheme locally. At first we were looked upon rather coldly by local nurserymen, but when they realized that we had created a demand for things on hand for which they had no orders, they became our warmest allies.

To put the project over required a strenuous program of talks, with and without lantern slides of plants brought into bloom in Houston, to Garden clubs all around Houston and neighboring towns. We cannot grow perennials in the accepted sense, but by actual experience, I had worked out the planting of permanent gardens which demonstrated our slogan, "Permanent Planting for Year Round Bloom." It is true that we have to treat tulips, Dutch hyacinths and daffodils by refrigeration to bring them into bloom and then replace them annually, but bulbs from tropical America, including *Amaryllis* L., and some bulbs from South Africa, and some Liliums, beardless iris, are superb here, as are also *Hemerocallis*. Thus we are not limited to a narrow range of plants after all. On request, I helped to organize the Houston Amaryllid and Bulb Society to meet the interest of the public outside our local Chapter of the Garden Club of America, and am at present in the process of shaping up the new Spuria Section, with a Spuria Test Garden to be set up early in the Fall under the auspices of the American Iris Society. Once this is accomplished, at my age, I look forward to a placid puttering about in my own little garden.

In our efforts, both the local Federation groups and the Council Groups have been our staunch supporters, as has also the State organization.

NEW ORLEANS AMARYLLIS SHOW, 1952

Mrs. W. D. Morton, Jr., *Chairman, Official Amaryllis Show, New Orleans*

One of the most outstanding flower shows ever staged in New Orleans was the Fourth Official Amaryllis Show on March 22nd and 23rd

Fig. 1. The Queen of the Official Amaryllis Show of New Orleans, 1952, Miss Phyllis Massicot (center) is crowned by Commissioner Victor Schiro at ceremonies at the MacMain High School Cafeteria. Others, from left to right, are Miss Shirlee Gaglieano, Miss Gayle Mackenroth last year's Queen, and Miss Ethelee Gaglieano.

1952. The Show was beautifully staged on the entire floor of the block square McMain High School cafeteria at 5712 South Claibourne Avenue.

The New Orleans Garden Clubs were represented in both artistic arrangements and horticulture. The *Amaryllis* exhibits made an outstanding appearance against the club colors of Jade Green and Silver. The show was judged by eight accredited Judges. The awards consisted of 3 gold cups, 5 APLS awards, 2 club ribbons, 2 sweepstakes, and 35 additional prizes. Two new features were added this year. The Junior Garden Clubs staged exhibits, and corsages made of *Amaryllis* were entered as exhibits. Both features proved most interesting. In the standard *Amaryllis* exhibits more quality bulbs were shown this year than ever before.

The main event of the show was the crowning of Miss Phyllis Massicot, daughter of Mr. and Mrs. Sidney J. Massicot as the "Official Amaryllis Queen of New Orleans" by the Hon. Victor Schiro, Commissioner of public Buildings and Parks. Maids were the Gaglieano twins, Misses Shirlee and Ethelee Gaglieano. Miss Gayle Mackenroth, last year's Queen returned to present this year's Queen (Figure 1). Commissioner Schiro presented the new Queen with an "Official Amaryllis Queen of New Orleans Certificate" and a gold key to the City.

Plans are now being made for a larger and finer show for 1953.

AMARYLLIS SOCIETY OF MOBILE

As we go to press word was received that the newly organized Amaryllis Society of Mobile is sponsoring its first Show, March 28-29, 1953, at the Murphy High School Cafeteria, Mobile, Ala. The Amaryllis Society of Mobile is affiliated with the American Amaryllis Society. The report on the Show will appear in the next issue of

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[Wilson—FAVOURITE DAFFODILS, continued from page 20.]

As last spring Empress of Ireland appeared to be up-to-date about the climax of my efforts in breeding white trumpets, I think I had better bring this already lengthy and somewhat rambling tale to a close. Of course quite a number of things that promise to be fine have appeared amongst my seedlings during the five years since Empress of Ireland flowered, but I daresay that as yet but few of them have fully grown up and shown the best that they can do. So it is perhaps best to wait and see before saying much of them—and of course I hope that still better and better flowers than any that have yet appeared may keep on coming to all lovers and breeders of daffodils as the years pass.

THE HOUSTON AMARYLLID AND BULB SOCIETY

Mrs. Asbury S. Parks, *Bulletin Editor, Houston, Texas*

The Houston Amaryllid and Bulb Society held its annual show this year in conjunction with the International Flower Show sponsored by the Men's Garden Club of Houston, and the Houston Beautification Program of the Chamber of Commerce. Mr. F. A. C. McCulla was chairman of the bulb show, and Mr. Paul Carroll was general chairman. The booth was well located [Fig. 2]. The exhibits of two of our local

Fig. 2. Exhibit at the 1952 Show of the Houston Amaryllid and Bulb Society. From left to right, Mrs. Asbury S. Parks, Mrs. J. Willis Slaughter, and Mrs. John Cashman.

nurseries were placed on the sides of our exhibit, and this gave a harmonious setting for the beautiful potted and cut Hybrid *Amaryllis*, iris, daffodils, and numerous other plants. The gold medal winners were a Black Calla exhibited by Mr. and Mrs. W. V. Vietti, and a white Dutch Hybrid *Amaryllis* exhibited by Mrs. G. B. Reneau.

The Society was organized in March of 1948 by Mrs. G. B. Reneau, Mrs. J. Willis Slaughter, and Mrs. Del B. Prosperi. Mr. Ben Duffie was the first chairman. A bulletin is issued quarterly.

AMARYLLIS SOCIETY OF MOBILE

The Amaryllis planting campaign initiated by Mr. Lou Costa, Garden Edit of the MOBILE PRESS REGISTER, and first President (1952-1953) of the AMARYLL SOCIETY OF MOBILE, has received the "wholehearted endorsement of the 1954 AZAL TRAIL COMMITTEE."

At the May meeting of the AMARYLLIS SOCIETY OF MOBILE, the following officer for 1953-1954 were elected: Mrs. A. Primo, President; Mr. Ed Shelton, Vice President, (Fairhope); Mrs. William O. Cazalas, Secretary, and Mr. Percy E Skinner, Treasurer.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 80.]

filiform, 8 mm. long, longer than the ovary. Collected in Chile, Bertero 290 in the DeCandolle Herbarium. *Gardinia violacea* Bertero, in mss. Common name: "mapolita."

Brodiaea amoghinoi Speg., in Rev. Facult. Agron. Vet. La Plata 3: 575-576. 1897. Triteleia, 1-valved, 2-flowered, with an ovate bulb, the leaves synanthous, linear, almost flat, rather obtuse at the apex, the scape equally long or shorter than the leaves, glabrous, slender, 2-bracteate at the apex, the flowers tubular, borne on rather long pedicels, the divisions very narrowly linear, rather thick, velutinous-papillose, olivaceous, crowning a shorter tube. It grows in sandy meadows along the Gulf of San Jorge, collected by Carlos Spegazzini in February, 1896.

Observations: bulb rather deeply (3.5 to 5 cm.) buried, ovate, 2 cm. high, 1 cm. in diameter, covered by many subhyaline thin tunics, bearing 5 to 8 leaves and 1 to 4 scapes at the apex; leaves synanthous, fasciculate, glabrous, green, narrowly linear, 8 to 12 cm. long, 2 to 3 mm. wide, rather obtuse at the apex, ampliate into a thin sheath at the base, the exposed portions rather flat or canaliculate-subplicate, the underground portions nervose-carinulate; scapes shorter than or rarely equaling the leaves, 5 to 8 cm. long, 0.8 mm. in diameter, terete, glabrous, livid, naked, erect, simple, 2-bracteate at the summit; bracts lanceolate-linear, 15 to 20 mm. long, 2 to 2.5 mm. wide, long-attenuate upwards, very much acute, the sheathing bases very shortly connate in ochrea-like fashion, 2 mm. long, thinly membranous, subhyaline, the outer one longer, very thinly and almost inconspicuously 7- to 9-nerved, the inner one shorter, 3- to 5-nerved; pedicels erect, livid, naked, 1 to 2 cm. long, 1-flowered; flowers solitary or paired in the bracts, the tube cylindric, 12 mm. long, 2 mm. in diameter, becoming livid at the base, toward the apex greenish-white, coarsely 6-striped with green stripes, the apex crowned with 6 lobes which are arched-spreading, subequal, always narrowly linear, 7 to 9 mm. long, 0.5 to 0.8 mm. wide, rather obtuse or short-acute at the apex, rather fleshy, rather rigid, on the upper surface convex slightly convex, densely velutinous-papillose, deeply and beautifully green-olivaceous, never white-margined; all the stamens included

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 53.]

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

DAFFODILS: THE PINKS, MINIATURES, NATURALIZING, DECORATIVES, AND A COMPREHENSIVE BEGINNERS' LIST

CAREY E. QUINN, *Washington, D. C.*

[The following extracts are quoted from a general review of daffodils (1952) written for members of the Washington Daffodil Society of which Mr. Quinn is the current President. The first part concerning a review of *Narcissus* stars is omitted here on account of space limitations.]

The Pinks. There is so much accent on Pinks at present that I feel I must devote a special paragraph to them. The greater percent of the pinks offered each year, with a few exceptions, are of small value from any critical standard. I believe that in a few more years there will be many fine and acceptable flowers with pink crowns. In the meantime the best I have seen or heard about are: PINK MONARCH, ROSARIO, ROSE of TRALEE, ROSY DIAMOND, SALMON TROUT, and maybe ROSY SUNRISE and KARANJA. I have not actually seen what are probably the two best of the lot—namely PINK MONARCH (Australian), and SALMON TROUT (Irish). But the items named are all fine flowers—their pink only one of their charms—and they would be rated as stars whether pink or not.

I decline to rate a daffodil on its pink suffusion or shade alone.

The Little Daffodils. You can't really compare the ever-increasing mass of small little flowers with the big ones that comprise most of those we have seen appraising hereinbefore. These small fellows I am therefore grouping largely around their use (not according to bloom period) in crannies, rock gardens, borders, living rooms—where anything imposing or over 16 inches tall would be out of place. There are beauties among the little fellows and I believe the future will have many more of them. Grace and charm are the underscored objectives we seek in the petite tribe—in short, the exquisite. I am including poets and some poetaz that seem to fit here better than elsewhere although not miniatures.

I doubt that I have or have ever seen a comprehensive collection of the small fellows. There is no Alec Grey in my acquaintance either altho my friend George Heath of Virginia is probably a good substitute. He raises many of the wee fellows. But here is a list of the best I have or have seen—featuring of course the usual elements of a good daffodil, and accenting charm as I know it.

ANGELINE (3b); FAIRY CIRCLE (3b); RIPPLING WATER (5); TR
AMBLE (5); ACOLITES (5); SILVER CHIMES (5); DAWN (5); RAINDR
(5); APRIL TEARS (5); JENNY (5); ESTRELLITA (6a); JONQUI
HELENA (10); MARCO (3b); BLACK PRINCE (9); KENTUCKY (9); M
UET (9); SMYRNA (9); QUEEN OF DIAMONDS (9); SHANACH (9); CA
TABILE (9); ACATEA (9); ANGIE (2c); HAWERA (4); WEE BEE (1a
CUSHLAKE (3c); PICATOR (3b); N. WATIERI (10); XIT (3c); SWEETNE
(7); CHERIE (7); JUNE (3b); SUN DISC (1a); KEHELLAND (1a); TAN
GRA (1a); FEBRUARY SILVER (6); and BERYL (6).

I know that I have left out some of the charming old standbys th
my lady friends will frown over. I've done it because there are bett
flowers available and I'm hoping the lovers of the little fellows will g
more critical. I've left out also some little fellows because despite th
small size they are queer, unbalanced and devoid of charm.

Naturalizing. Most of the bulbs sold for naturalizing are no
especially adapted or fitted by nature for the role. Of course some va
rieties will do better than others. So-called "Naturalizing Mixtures" i
most instances are just a way to dispose of bulk quantities of cheap
nameless bulbs. Few Daffodils planted in turf or meadows will stay
there—they either starve or rot in a few years, altho *some* of the old
varieties not too far removed from the wild will persist remarkably well.

Of course if by "naturalizing" you mean planting in well drained,
reasonably good soil in open woods or borders where there is no great
turf competition or other matted vegetation,—then any daffodil will
serve—just consult your purse.

But for real "naturalizing" the only daffodils fitted by nature for
the job are some of the little fellows we have just been discussing. The
famous meadow park approaches to the equally famous Wisley Gardens
in England demonstrates naturalizing with "Bulbocodium" and "Cyc-
lamineus" and these little 4 and 5 inch fellows actually thrive in the
turf, seeding themselves and multiplying so that they make a tremendous
picture. I certainly hope our breeders will look into these possibilities.

So I want to urge the naturalizers to turn to the various "Bulbocod-
ium" forms, to the "Cyclamineus", some *N. triandrus* and the "species
jonquils". The "Cyclamineus" forms even enjoy sour, damp soil that
will turn up the toes of most daffodils. And finally, these aforementioned
fellows in bloom last a very long time—a most desirable feature in the
open meadow drifts.

The Decoratives. There are a certain number of Daffodils that are
striking, different, showy,—the ones that 8 out of every 10 ordinary
persons will rush to and exclaim over. Most of these wenches can never
be stars (there are a few exceptions) because they usually have some bad
defects and yet we love them and grow them. Let's call them "decora-
tive" and accept them in a place of their own. Who am I to look down
my nose at them even of a lot of them are "hussies". A "hussie" is
alright in her place as long as she is pretty. They are the ones a lot of
people want—in fact all they want. They make a colorful mass picture
in perennial borders or in nooks between shrubbery planted in three or
five contrasting colors. And as material for arrangements,—

No I'm not turning up my nose—instead I am listing about 50 of the best and most strikingly unusual that you will find easy to grow and to keep. They are good flowers and a lot of my listeners here will think they should be over in the "Star" groups. ADA FINCH (1c); BALMORAL (2a); BROOKVILLE (2b); CELLINI (2a); CHERIE (7); CHEERIO (2a); CHAMPAGNE (2b), (pink); DICK WELLBAND (2b); DURESTAN (3b); DUKE OF WINDSOR (2b); FANCHEON (2a); FALAISE (4); FRAU ANGELICO (2a); FRILLED BEAUTY (2b); FLORA's FAVORITE (2b); GAPILLON (2b); GRATIA (2b); HARDY (2b); JOHANNESBURG (2b); JULES VERNE (2c); KANDAHAR (1a); KANCHENJUNGA (1c); LADY KESTEVEN (3b); LA RIANTE (3b); LAUSANNE (1a); MABEL TAYLOR (2b), (pink); MERAPI (2a); MUSIC HALL (1b); NELLIS FAVORITE (3a); ORANGE BUTTON (3b); PAPILLON BLANCHE (3b); PRINCE OF ORANGE (2a); PIN WHEEL (2b); PRINCE FUSHIMA (2b); QUEENIE (2c); RADIUM (3a); REDMARLEY (2a); REVE D'OR (2a); ROBBIN HOOD (1a); ROXANE (1c); SCARLET LEADER (2a); SELAM LAGERLOFF (2b); SHANGHAI (2a); SMARGAD (2b); TEXAS (4); TUNIS (2b); TWINK (4); UNSURPASSABLE (1a); WALTER J. SMITH (2b); WODAN (2a); OKLAHOMA (1b).

Suggested Daffodils For Beginners. While this review is not intended primarily for either casuals or beginners, yet perhaps I should here include the list of recommended varieties prepared by the Washington Daffodil Society for these Classes of gardeners. Some of the items are not the ones I would have preferred, yet it is a good list of dependable inexpensive varieties for the beginner—in fact the best and most intelligent one I have seen.

Trumpets

Dawson City, 1a (yellow)
Lord Wellington, 1a (yellow)
Music Hall, 1b (bi-color)
Beersheeba, 1c (white)
Roxane, 1c (white)

Large Cups

Fortune, 2a (yellow)
Scarlet Elegance, 2a (Yellow-red)
Hades, 2b, (white-red)
John Evelyn, 2b (white-orange)
Niphetos, 2c (white)

Small Cups

Alight, 3a (yellow-red)
Mangosteen, 3a (gold-red)
Carolina, 3b (white-red)
Firetail, 3b (white-red)
Samaria, 3c (white)

Double

Cheerfulness, 4 (white)

Triandus

Thalia, 5a (white)
Agnes Harvey, 5b (white-lemon)

Cyclamineous

Orange Glory, 6a (yellow)

Jonquil

General Perishing, 7a (yellow)
Trevithian, 7b (bi-color)

Tazetta

Geranium, 8 (white-orange)

Poet

Actaea, 9 (white-red)

Species

Ionquilla simplex, 10 (gold)

[EDITORIAL NOTE.—The editor suggests that similar lists of "Daffodils for Beginners" for each of the climatic regions of the U. S. and Canada be assembled by the NARCISSUS COMMITTEE for publication in 1954 HERBERTIA. This will do much to widen the interest in *Narcissus*.]

NARCISSUS VIRIDIFLORUS

HAMILTON P. TRAUB, *California*

Several years ago Jan de Graaff kindly sent the writer three small seedling bulbs of *Narcissus viridiflorus* Schousb. These were potted in a mixture of one part each of clayey loam soil, coarse sand and black carex peat. These plants were watered regularly and fertilized with Vigoro (at fortnightly intervals) from September through April, and

Fig. 3. *Narcissus viridiflorus*. Left, seedlings; note single leaves of two seedlings not in flower, and inflorescence of center seedling without a leaf. The top of this same inflorescence is shown in natural size to the right.

were kept entirely dry in the pot from May through August. The plants did not flower during the first two years but one bulb flowered in the fall of the third year as shown in Fig. 3. The following year all three bulbs flowered. The flowers are entirely green and give off a delightful fragrance that can be detected over a wide area. It is a very charming subject which should be more widely cultivated. In the Southwest, par-

ticularly in California, the species thrives out of doors and blooms regularly in the fall. Unfortunately, sufficient stock is not as yet available, but it is hoped that before long this deficiency will be corrected by the commercial growers.

It may be that this species can be used in breeding experiments. Such attempts will be started by the writer during the season 1953-1954. This may not be an easy project but is surely worth trying.

A report on *Narcissus rupicola*, *N. serotinus*, *N. cyclamenius*, *N. scaberulus*, *N. jonquilla* var. *henriquesii*, *N. bulbocodium* var. *nivalis*, *N. bulbocodium* var. *concolor*, *N. bulbocodium* subsp. *obesus*, *N. triandrus* var. *cernuus*, and *N. asturiensis* as grown under southern California conditions will be included in a later issue of HERBERTIA.

In the article that follows these notes, Mr. Hannibal discusses the subject of fall-flowering *Narcissus* species from the standpoint of breeding.

THE FALL FLOWERING NARCISSUS

L. S. HANNIBAL, *Calif.*

The Fall Flowering *Narcissus* have been known for many years, but their star of popularity is near nil since only a few collectors have seen or grown the plants. Yet they have no particular cultural problems if grown in large pots or well drained frost free beds containing a sandy-clay-loam mixture.

The writer became interested in the group some ten years back when it was suggested that they could possibly hybridize with the spring flowering Daffodils to produce a fall flowering type. Thus far little has been accomplished beyond propagating a quantity of these hard-to-locate bulbs. The hybridizing of fall daffodils is as remote as ever since genetic studies have indicated that the problem is far more complex than the layman would anticipate. Nevertheless the lack of results should not deter a discussion concerning the habits of these odd plants.

In 1858 Gay established the section *Autumnales* to the genus *Narcissus* L. in order to account for the fall flowering species that he knew: *Narcissus elegans* Spach., *N. serotinus* L., and *N. viridiflorus* Schousboe. This is a mechanical arrangement that is entirely satisfactory from a geographical or cultural standpoint, but there have been some minor variations in morphology that have caused the experts to disagree in a number of ways as to the validity of such an arrangement. The decision was finally settled through chromosome studies by Dr. Fernandes (1943) in Portugal. These studies will be touched upon later, but for the time being Gay's outline is very convenient.

Narcissus elegans Spach grows along the shores of the Mediterranean from Morocco to Tunis, and in some scattered areas about Sicily and Southern Italy. Rarely is it found more than a half score miles inland. In most instances the bulbs are located on limestone or clay hillsides where the soil is thin and well drained.

Growth begins in October with the first light rains. One or two leaves emerge a few days after the moisture reaches the bulb which is four or five inches down. The scape shows shortly after and often within a fortnight the bulbs will be in flower. *N. elegans* is considered a *Tazetta* and on seeing a cluster of blossoms one can readily recognize the relationship. The flowers are definitely such with long slender milk-white segments, a small cup varying from yellow-green to citron depending upon the age. Even the blossoms have the characteristic odor of the "Paper White" *Narcissus*. Usually the blossoms last several weeks and during this time the petals slowly reflex to take on a twisted appearance, making the flower appear as a child's small paper pinwheel. Then too the scape which may be three or four inches when the bud opens continues to grow until long after the flower fades, eventually reaching a length of 18 inches or more by the first of March.

This habit of scape elongation is not limited to *N. elegans* as it also occurs with the other two species, which are actually sometimes leafless. This point represents an interesting economy of foliage with a consolidation of functions where the scape either assists the leaves or replaces their function entirely depending upon the species. The combination of a shortage of moisture and very long growing period makes this possible.

Dr. Fernandes (1943) has pointed out that *N. elegans* has two subspecies: variety *intermedius* Gay having a larger diameter scape and being most closely a *Tazetta* whereas variety *fallax* F.Q. is of more recent origin. The chromosome number (20) is identical, but the pattern varies slightly.

Narcissus serotinus L. is a dwarf autumn species somewhat reminiscent of *N. elegans*. Its native range covers most of the shores of the Mediterranean from Gibralter to Egypt and Lebanon. Apparently it grows under a variety of soil conditions and rainfall. Tom Craig (1946) commented recently upon its erratic habits and flowering habits in French Morocco where the minute blossoms had the facility of appearing most everywhere, even in the middle of the army drill fields.

A single flower generally appears upon a leaf like scape. Leaves themselves rarely appear as the scape functions as a leaf. The wee flower is well shaped with nicely rounded petals about a proportionally large cup, but the parts are all so small that if the flower were placed face down on a 10 cent piece the perianth segments would barely cover the coin.

Narcissus viridiflorus Schousboe is also sometimes leafless, unless one considers the scape a leaf. The interesting features are the extreme reduction of all flower parts to the ultimate minimum and the introduction of green chlorophyll into the petals such that they too function as leaves. The small slender green-rayed flower, with its very small six-

segmented corona, is delightfully fragrant and will perfume an entire garden. It has the Jonquil odor 100%.

The natural range of this plant is very restricted, being found only about Gibralter and Tangiers, and usually in clay soils. However the writer has found it very adaptive to many localities in California. The segmentation of the corona into six small lobes has long puzzled botanists, who, not knowing that the *Jonquillae N. rupicola* was similarly lobed, considered this a unique primitive factor and went to some trouble to substantiate the relationship of *N. viridiflorus* to the other *Autumnales*. Dr. Fernandes (1943) has settled this difficulty. The chromosome patterns of *N. viridiflorus* and *N. jonquilla* L. are identical except that *N. viridiflorus* has double the number (28) of *N. jonquilla* L. (14). This may point to a close relationship and may indicate that *N. viridiflorus* with its high count is far from primitive.

It also appears that the cleft corona is not so rare either. A *N. schizocoronatus* bicolor (Meyer, 1936) hybrid has been isolated and bred with this cleft corona. The character does not appear particularly primitive or recessive.

To some, chromosome studies may appear confusing, but they can be a very useful tool. The established relationship of *N. viridiflorus* to the *Jonquillae* group gives a clew as to the most practical line of inter-species breeding to be taken. Namely that if viable seedlings are desired the Jonquil would be the most promising line of material to work with.

In turn *N. elegans* with its 20 chromosomes resembles the Tazetta patterns of 20 and 22 chromosomes and should cross with "Paper White" or one of the other few viable forms in the trade. It may be a waste of time to cross *N. elegans* with a trumpet daffodil, or Incomparabilis, as the Tazettas rarely take on these forms. It may, however, produce sterile hybrids with *N. triandrus* or *N. poeticus* species..

Narcissus serotinus has a chromosome count of 30 and its analysis is quite distinct from any other known *Narcissus* form. It probably represents an "orphan" group. Sterile hybrids, both natural and man-made, have been reported (4) between it and *N. viridiflorus*, so it is possible that it may breed with others of the *Jonquillae* group, and it may cross with other polyhybrid daffodils.

It appears that if the Fall flowering Narcissus have any potential values for breeding the combinations may be limited. Pollens can be stored for six weeks or more, but some tricky temperature controls are needed to advance or retard flowering dates to effect the crosses.

The culture of the species fall-flowering *Narcissus* is not difficult if conditions simulating their Mediterranean homeland are maintained. The most necessary item is a hot dry summer position where the bulbs bake for a long period. Soil temperatures of 90 or 100 degrees appear beneficial and will insure certain flowering. More than a mild frost may burn the foliage, but frosts of 18 degrees has not been serious. The major distinction is seed germination. Seeds of the *Autumnales* germinate as soon as the ripe seeds drop to the ground. This is a bit unusual

as all other Daffodils require that their seed remains dormant over the summer and be planted the following fall. Attempts to send fresh seed from Europe to South America disclosed that this aestivation was necessary, as the six months difference in seasons discouraged germination completely for fresh Daffodil seed.

The reclassification of *Narcissus* sections *Jonquillae*, *Autumnales*, and *Hermione*: Since Dr. Fernandes work on the species of *Narcissus* has been mentioned in the preceding article we present herein his recent reclassification as published in the Boletim da Sociedade Broteriana. Vol. 17, 2a series, P. 38 (1943).

Jonquillae DC. ap. Red.
N. scaberulus Henriq.
N. calcicola Mend.
N. rupicola Durf.
N. Watieri Marie
N. juncifolius Lag.
N. gaditanus Boiss. et Reut.
N. jonquilloides Willd.
N. viridiflorus Schousboe

Serotini Parl
N. serotinus Linn.
Hermione (Salisb.) Sprenger
a) *Autumnal* (Baker)
N. elegans Spach.
var. *intermedius* Gay
Var. *fallax* F. Q.
b) *Vernal* (Baker)
N. *tazetta* Linn.

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A NEW RAIN LILY FROM TEXAS

Fred B. Jones, *Texas*

Three years ago, in the early part of July, 1949, the writer happened to be driving near a cotton warehouse in the little south Texas town of Taft, which was then his home, when suddenly, he became aware that growing along the roadside, among the low-growing weeds and grasses, were numerous rain lilies, their flowers just beginning to open. It was about 2:30 o'clock in the afternoon, which seemed to be an odd time for rain lilies to be opening. But stranger still, the color of these bursting buds was not white, as one would expect, but yellow.

On stopping to get a closer look, it became apparent that there were two varieties, one quite small in flower, a good deal smaller than the usual *Zephyranthes brazosensis* (syn.—*Cooperia drummondii*) [Fig. 4]: the other was much larger, about twice the size of the smaller one, and

different also in form, which became more evident as the flowers opened out. The color, foliage and time of opening of the two varieties appeared to be about the same.

A detailed examination showed that the midget variety must surely be *Zephyranthes smallii* (Alexander) Traub [Fig. 4], a species discovered about 160 miles due south of Taft, in or near Brownsville, at the southern tip of Texas by Robert Runyon of that city.

The other yellow variety growing with *Z. smallii* defied all efforts at identification, so a brief description of it was sent to V. L. Cory, Field

Fig. 4. Texas *Zephyranthes:* (left) *Zephyranthes jonesii;* (right) *Z. brazosensis;* and, (in front) two flowers of *Z. smallii.* Photo by Fred B. Jones.

Botanist of Southern Methodist University at Dallas (See V. L. Cory, "The Genus Zephyranthes in Texas," *Herbertia* IV, 117-120). Cory was of the opinion that the large-flowered yellow variety was a new species, and after studying herbarium material of it, he concluded that indeed, here was a new *Zephyranthes* [*Cooperia*] deserving of specific rank. Naming it [*Zephyranthes jonesii* (Cory) Traub] in my honor for having found it, Cory published the description in *Field and Laboratory* in January, 1950 (Vol. XVIII, No. 1, 43-46), as follows:

Bulb subglobose, 2.5-3 cm. in diameter, with its base seated usually about 7.5 cm. below surface of ground; scape up to 3 dm. high or more; leaves slightly glaucous green, 2-3 cm. wide and 25-35 cm. long, the tips

not acute, perianth-segments yellow, 3-4 cm. long, oblanceolate to oval; perianth-tube up to 5.5 cm. long or more; style white, 6-7.5 cm. long, the stigma markedly exceeding the stamens (as much as 5 mm.); ovary slightly or not at all stipitate.

Recognizing the close relationship of the new species to *Z. smallii*, Cory made a comparison of the two species, chief points of difference being the length of the tube and style, relation of stigma to anthers, shape of the perianth segments, and as already mentioned, the size of the flowers. In other respects the species are very close, notably in size and shape of the bulb, foliage, color of the flower, time of opening in the afternoon and in habitat.

In the interval between the time that the plants were first observed and when Cory described the new species, the writer had ample opportunity to study *Z. jonesii* (Cory) Traub in its habitat [Fig. 4]. He found it to occur only in situations where water collects after heavy showers, these spots being as a rule the elevated portions of the swales which occur with some frequency in this coastal area of Texas. Never did he find it in the lower and wetter portions of these swales where certain other amaryllids do grow. The soils in which the species is found vary from rather heavy clayey soils to somewhat sandy, silty types, alkaline in reaction no doubt. These particular soils are usually tillable, especially if the swales are drained, and being tillable, they have largely been put to the plow. This is likely the reason why *Z. jonesii* occurs, so far as I can determine, in only a few locations, all in an area about 15 miles in length and 6 miles in width. In not a single location is the species abundant and not all the specimens one finds are true to the type. In fact, some forms intermediate between *Z. jonesii* and *Z. smallii* have been observed, one in particular having the longer perianth-tube of *Z. jonesii* but otherwise more like *Z.smallii*. Cory thought that these intermediate forms might possibly be hybrids.

In cultivation *Z. jonesii* seems to have about the same requirements as other well-known species, namely rich, well-drained soils and plenty of moisture. While it grows in full sun in nature, it has bloomed well for me in a lathhouse.

In Texas, the flowers open from the 5th to the 8th day following a good rain, in the months of July, August and September. Under favorable conditions this species blooms into November. The flowers hold their color well the first afternoon, but in full sun or warm weather, will fade to ivory on the second day. From the accompanying photograph, it can be seen that the perianth is of attractive form and quite large enough to make a show if planted in masses in the border or rock garden. The scent is faint and delicate.

It seems strange that this species should have been overlooked by other observers and collectors, however, it may be noted that new species of plants are constantly being found in Texas, especially in the western and southern parts. There may still be undiscovered rain lilies in this region. The search for these little gems is indeed fascinating, and lucky is the plant lover who happens to be at the right spot at the right time, for this is what it takes to find a new rain lily.

THE RANGE OF ZEPHYRANTHES TRAUBII IN TEXAS

Fred B. Jones, *Texas*

In June, 1952, Dr. Traub mentioned that bulbs collected by Dr. Ruth Patrick on the site of the new Du Pont plant in Victoria County had been identified as *Zephyranthes traubii* (Hayward) Moldenke. This is the lovely white species, rare in cultivation, which Mr. Stansel discovered several years ago on the grounds of the Angleton Experiment Station south of Houston (See HERBERTIA III, 63).

It happens that the Du Pont plant is no great distance from Corpus Christi, so following a general rain in September, I set out in the general direction of the site, hoping to find this species in bloom. Long before I reached the plant—actually I never got even near it—I discovered colonies of a white Zephyranthes which appeared to be *Z. brazosensis* Traub (Syn. *Cooperia drummondii* Herbert), the common white species so abundant in some parts of Texas. But as the latter species usually doesn't grow in colonies, I took a peek through my binoculars. Here and there, scattered among the native wildflowers and grasses, were handsome rain lilies with slender, reflexed tepalsegs fluttering in the breeze. These couldn't be *Z. brazosensis*, I thought, so I crossed a ditch of water to investigate. It didn't take long to determine that here was a pure stand of *Z. traubii* in full bloom (Fig. 5), something I had been looking for in the counties somewhat to the south and west for years. The location of this and the other colonies I saw was roughly between San Antonio and Copano bays, somewhat back from the coast, and about 100 miles southwest of Angleton, the type locality.

The big surprise was the variation in size and form of the perianths of the specimens in bloom. I expected to see about the same amount of variation as commonly occurs in other Texas Zephyranthes. But in each colony I visited, I found this startling variation, so it may be characteristic of the species. The largest perigone I saw measured 2¾ inches across; the smaller ones weren't half as large. The tepalsegs likewise varied a great deal, some being long and narrow, often recurved; others were broad and not recurved at all. Many specimens looked a good deal like *Z. brazosensis* even at close range, yet practically all had the highly elevated stigma and extremely narrow, glaucous foliage typical of the species; and samples of bulbs taken from place to place indicated that practically no variation occurs in their size and shape. The largest bulbs were much smaller than those of the usual *Z. brazosensis*. The comparison with the latter species is made because the two species are obviously very close, as noted by Hayward in the original description. *Z. traubii* (chromosome number, 2n=24) is a more dainty and slender species than the tetraploid *Z. brazosensis* (chromosome number, 2n=48), yet the flower is proportionately larger, at least in some speci-

mens. *Z. traubii* seems to be a very distinct species, and undoubtedly one of the most charming of all *Zephyranthes*.

The colonies observed were growing in rather poorly-drained, dark-colored clays, alkaline in reaction no doubt. I think these locations had never been in cultivation, in any case, there was every evidence that they had been grazed for many years.

Fig. 5. *Bottom photo,* Colony of *Zephyranthes traubii* (Hayward) Moldenke in Calhoun County, Texas. *Upper left,* specimen representing the typical form; *upper right,* showing variation in perigone shape. All photos taken in September 1952, in mid-afternoon by Fred B. Jones.

Several questions remain to be answered about this species. One is its range. Indications are that it is rather widespread, perhaps occupying what is known as the gulf coast prairie. But some students have probably mistaken it for *Z. brazosensis*, so that a good deal of field study

will be necessary to determine exactly its distribution. It will be interesting to know, incidentally, if it usually occurs in colonies, as in Calhoun and Refugio counties where I observed it. Possibly it doesn't grow along roadsides and in every favorable location, becoming a weed pest, as is the case with *Z. brazosensis*.

The question of the perigone variation is an intriguing one. A study of the species in cultivation ought to throw light on this problem. It may turn out that the age or condition of the bulb determines the size if not the form of the perigone, but this is only a guess.

HYBRID AMARYLLIS TRIALS, 1952

THOMAS R. MANLEY, *Vermont*

This report, the third, of the initial *Amaryllis* trials represents the final rating of many varieties and the inclusion of new varieties received for evaluation in the fall of 1951. Plants that were forced for the Cleveland Flower Show in 1950 and 1951 were allowed to bloom naturally. Many varieties were slow in recovery from the apparent shock forcing gives them, those making rapid recovery were given full consideration of their exceptional vigor.

During the vegetative season the plants were watered regularly and received weekly applications of liquid cow manure plus 1 tablespoon of 5—10—10 per pot each month, May through August.

The great demand for highly rated varieties has far exceeded the ability of the Dutch bulb growers to supply them. As a result bulbs have been marketed that were undersized thus not able to produce results comparable to the large mature bulbs of the initial years of trials. This has given several of our leading American *Amaryllis* importers much concern. We are aware of this condition and are unable to remedy it, however we suggest you plant and carefully grow your *Amaryllis* if small or immature bulbs are received for a season, removing the scapes as soon as the florets fade. Do not allow seeds to develop as they devitalize the plant reducing the chances of huge blooms the following season.

Cultural practices during the blooming season are vital to the production of flowers and a dry cool rest period, when the plant is completely dormant is most essential.

We are receiving many new varieties for trial in 1952 and will report their performance in the HERBERTIA each season. Although not at Valleevue Farm, I am now located at Champlain View Gardens, Burlington, Vermont, here we have ample greenhouse space for *Amaryl-*

lis evaluation. Those desirous of having *Amaryllis* evaluated may do so by sending 3 large bulbs of a variety to me at my new address.

The letter rating of AA—Superior; A—Excellent; B—Good; C—Fair, for discard is based on clean color, floret size, number of scapes per bulb, number of florets per scape, floret form, floret substance, length and texture of scape and vigor of bulb and foliage.

SALMON

BOUQUET, Ludwig. Light salmon that pales considerable as it ages. Huge flat florets. 2 scapes 18″ tall with 4 seven to nine inch blooms. Rating A.

MONA LISA, Ludwig. A salmon suffused pink. Color irregular and fades, 2 scapes 15″, 3 to 4 five and one-half inch blooms. 1950 rating —C; 1951—C. Final C.

QUEEN'S PAGE, Warmenhoven. Clean salmon orange, 3 scapes 20″ tall with 4 eight inch blooms. Rating 1950—A; 1951—AA; Final A.

SALMONETTE, Warmenhoven. Listed in 1950 as Salmon Joy, a name duplication. Clear salmon with deeper salmon in throat. 2-3 scapes 24″ tall with 4 to 6 eight inch blooms. Rating 1950—A; 1951—A; Final A.

SALMON JOY, Ludwig. Salmon scarlet, blending to deep red at base of petals, occasionally scratchy white line on throat, heavily substanced floret, wide open. 3 scapes 22″ tall with 4 nine inch blooms. Rating 1950—A; 1951—A; Final A.

SWEET SEVENTEEN, Warmenhoven. Frosty salmon rose on white, giving a flesh pink tone to the floret. 3 scapes 20″ tall with 4 nine inch blooms. Rating 1950—B; 1951—A; Final A.

ORANGE SCARLET

BORDEAUX, Warmenhoven. Clean light orange scarlet, blending to deep scarlet in throat. 2 scapes 28″ tall with 4 ten inch florets. Rating 1950—A; 1951—A; Final A.

CARUSO, Ludwig. Orange scarlet intensifying at base of petals, slight striation at base of petals. 2-3 scapes, 24″ tall with 4 eight inch blooms. Rating 1950—B; 1951—B; Final B.

GENERAL MacARTHUR, Ludwig. Brilliant metallic red, velvety and glossy in appearance, large flat blooms. 2 scapes 15″ tall with 4 six to eight inch blooms. Rating A.

INVINCIBLE. Ludwig. Smooth orange scarlet, blending to deep red in throat. 2-3 scapes 22″ tall with 4 nine inch florets. Rating 1950—A; 1951—AA; Final A.

SCARLET

FIRE KING, Ludwig. Scarlet, deepening to medium red in throat, floret long tubed. 2-3 scapes, 18″ tall with 4 six inch florets. Rating 1950—B; 1951—A; 1952—B.

HALLEY, Ludwig. Clean, frosty scarlet with great substance and growth. 3 scapes 22″ tall with 3-4 eight and one-half inch florets. Rating 1950—AA; 1951—AA; Final AA.

LUDWIG'S SCARLET, Ludwig. Glistening scarlet, blending to deep red in throat, color breaks to yellow green at base of petals. 3 scapes 26″ tall with 4 seven and one-half inch blooms. Rating 1950—B; 1951—B; 1952—A.

PRINCE OF ORANGE, Warmenhoven. Scarlet, blending deep in throat, fades as floret ages. 3 scapes 19″ tall with 3-4 eight inch blooms. Rating 1950—B; 1951—B; Final B.

SCARLET BEAUTY, Warmenhoven. Scarlet blending to medium red to dark red in throat. Possesses a velvety sheen that glistens. 3 scapes 24″ tall with 4 nine inch blooms. Rating 1950—A; 1951—AA; Final—A.

SCARLET LEADER, Ludwig. Scarlet suffused with red suffusion lines intensifying in throat. 3 scapes 22″ tall with 4 seven inch blooms. Rating 1950—B; 1951—A; Final A.

SCARLET TRIUMPH, Warmenhoven. Clear scarlet appearing nearly light red. Leathery substance to florets. 3 scapes 24″ tall with 4 ten inch florets. Rating 1950—A; 1951—A; Final A.

PINK

DORIS LILIUM, Ludwig. Light rose pink deepening to rose in throat, very heavy substance. 3 scapes 20″ tall with 4 six inch blooms. Rating 1950—A; 1951—A; Final—A.

FIDELITY, Ludwig. Pale rose pink with green at base of petals, clean color, 3 scapes 14″ tall with 3 to 4 five inch blooms. Rating 1950—B; 1951—B; 1952—B.

LIBERATOR, Ludwig. Salmon rose with deep rose red throat, midribs of lower petals white. Color appears as a suffusion of rose salmon on white giving a netted appearance. 3 scapes 26″ tall with 3-4 seven inch blooms. Rating 1950—B; 1951—B; 1952—A.

MARGARET TRUMAN, Ludwig. Soft light rose that does not open flat but possesses a color that is new and pleasing. 2 scapes 18″ tall with 3 to 4 seven inch blooms. Rating AA.

DEEP ROSE

AMERICAN FASHION, Ludwig. Deep rosy pink that failed to open wide. 2 scapes 18″ tall with five inch blooms. Rating C.

FANTASY, Ludwig. Rose and white bicolor, each petal has marginal half rose and throat creamy white. 2 scapes 20″ tall with 4 five and one-half inch blooms. Rating 1951—B; 1952—B.

PINK PERFECTION, Ludwig. Clear medium rose with brighter color toward the margin of the petals giving a pink halo effect. 2-3 scapes 30″ tall with 4 seven inch blooms. Rating 1951—A; 1952—A.

VIOLETTA, Warmenhoven. Medium to deep rose with a light rose throat. Light rose midribs. 3 scapes 22″ tall with 3-4 eight inch florets. Rating 1950—B; 1951—B; Final—B.

LIGHT AND MEDIUM RED

AMERICAN EXPRESS, Ludwig. Huge, clean, medium red blending into deep red in throat. Substance excellent for large floret. 2 to 3 scapes 28″ tall with 4 ten inch florets. Rating 1950—AA; 1951—AA; 1952—AA.

ANNA PAULOWNA, Warmenhoven. Glistening light salmon red with deep red throat. Fades as it ages. 2 to 3 scapes 26″ tall with 4 eight inch florets. Rating 1950—B; 1951—A; 1952 B.

BRILLIANT, Ludwig. Very thin leathery light red with deep red in throat, occasional irregular white line on lip petal. 3 scapes 24″ tall with 4 six inch florets. Rating 1950—B; 1951—B; Final B.

MOTHER'S DAY, Ludwig. Medium rose red deepening to crimson red in throat with white striping at base of petal. Irregular flecks of darker red to violet red appear in petals. 2-3 scapes 20″ tall with 3-4 six inch florets. Rating 1950—B; 1951—B; Final B.

ORANGE KING, Warmenhoven. Light red that loses its color as the florets age giving a blue gray sheen. 2-3 scapes 18″ tall with 4 eight inch florets. Rating 1950—B; 1951—A; Final B.

ORANGE WONDER, Ludwig. Light red blending into a pink to white throat. Color combination is odd and blending not too smooth. 2 scapes 21″ tall with 4 five inch florets. 1950—C; 1951—B; Final B.

SHAKESPEARE, Ludwig. Glistening medium red, blending to deeper red in throat, white line on some petals most prominent in throat. 3 scapes 18″ tall, with 4 six inch florets. Rating 1950—A; 1951—A: Final—A.

WYNDHAM HAYWARD, Ludwig. Huge glistening red with a metallic finish, particularly outstanding and worthy of the name it is its honor to possess. 2—24″ scapes with 4 flat eight inch blooms. 1952 AA.

DARK AND WINE RED

FRANKLIN ROOSEVELT, Ludwig. Deep rose red that pales from the margin as it ages. Velvety sheen deep in the throat. 2 scapes 24″ tall with 4 seven inch blooms. Rating B.

LUCIFER, Warmenhoven. Medium dark red of great substance. 2 scapes 19″ tall with 4 eight inch florets. Rating 1950—B; 1951—B; Final B.

MORENO, Warmenhoven. Medium dark red with slight suffusion of rose red in throat. 3 scapes 26″ tall with 4 eight inch florets. Rating 1950—AA; 1951—A; 1952—AA.

MYSTERIE, Warmenhoven. Rose red blending to deep red in the throat. Midribs and tips of petals are rose. 2 scapes 20″ tall with 4 seven inch florets. Rating 1950—B; 1951—B; Final B.

RED MASTER, Warmenhoven. Huge dark red of great substance with flat florets. This variety possesses the deepest color of any amaryllis. Its floret size may be due to its inability to hold over 3 florets per scape. 2 scapes 24″ tall with 2-3 eleven to twelve inch blooms. Rating 1950—AA; 1951—AA; Final—A.

WHITE

CASPER LUDWIG, Ludwig. Pure white with yellow green line in throat, 3 to 4 scapes 16-20″ tall with 4 five inch blooms. Rating 1950—B; 1951—B; Final B.

EARLY WHITE, Ludwig. Very early pure white with faint green tinge deep in throat, good substance. 3 scapes 22″ tall with 4 to 5 six and one-half inch blooms. Rating 1950—A; 1951—A; Final A.

JOAN of ARC, Warmenhoven. Pure glistening white with green in throat. 2-3 scapes 24″ tall with 4 to 6 seven and one-half inch blooms. Rating 1950—A; 1951—A; Final—A.

LEADING LADY, Warmenhoven. Wide open pure white with green throat. 3 scapes 20″ tall with 3 to 4 seven inch blooms. Rating 1950—B; 1951—B; Final A.

LUDWIG'S SENSATION, Ludwig. White with greenish tinge deep in throat. 2-3 scapes 18″ tall with 4 six to seven inch blooms. Rating A.

MOUNT TACOMA, Warmenhoven. Pure white with faint green tinge in throat. Petals are winged at base, 3 scapes 24″ tall with 4 seven inch blooms. Rating 1950—A; 1951—A; Final—A.

NIVALIS, Ludwig. Creamy white with greenish tinge in throat. 2 scapes 15″ tall with 4 five inch blooms. Rating—B.

QUEEN of the WHITES, Warmenhoven. Glistening waxy pure white with faint tinge of green in throat, blooms flat with slight recurve at tip. 3 scapes 25″ tall with 4 to 5 nine inch blooms. Rating 1950—AA; 1951—AA; Final AA.

SNOW QUEEN, Ludwig. Pure white with faint green tinge. 3 scapes 18″ tall with 4 five and one-half inch blooms. Rating 1950—B; 1951—B; Final—B.

WHITE GIANT, Ludwig. Early pure frosty white with green tinge in throat. 3 scapes 24″ tall with 5 six inch blooms. Rating 1950—A; 1951—A; Final A.

WHITE STRIPED

KING of the STRIPES, Warmenhoven. Frosty pale pink to white with two broad undefined lines of carmine shading to vermilion in throat on each petal. 3 scapes 24″ tall with 3-4 five inch blooms. Rating 1950—A; 1951—A; Final A.

STRIPED BEAUTY, Warmenhoven. Orange scarlet lines that cover a large part of the petal giving the appearance of a white border. 3 scapes 20″ tall with 3-4 six inch blooms. Rating 1950—B; 1951—A; Final—A.

A PERSONAL EVALUATION OF SOME HYBRID AMARYLLIS CLONES, 1952

ROBERT GRANT THORNBURGH, *California*

Realizing that an attempt to evaluate the quality of hybrid *Amaryllis* clones to be found in the market today opens one to criticism, this one is presented with certain reservations. After following the ratings of Mr. Thomas R. Manley a personal rating was attempted in a round robin letter which later got into print in the last HERBERTIA.

This rating is certain to be far less scientific than Mr. Manley's for the reason that all the bulbs mentioned may not have had precisely the same attention as to feeding, potting mixtures, etc. Most of them, on the other hand, received about the same care in potting up, watering or feeding that one who has other time consuming activities can reasonably accomplish. They might be thought of, therefore, as receiving the same attention that any average busy person might give. Many of the bulbs were bloomed for the first time yet others had bloomed from one to several previous years.

Mr. Manley's ratings were more comprehensive, taking into account several factors that did not seem important for the writer's personal desires. The ratings, accordingly, will differ and are probably not com-

parable. For example, Mr. Manley based his ratings on "clean color, floret size, number of scapes per bulb, number of florets per bulb, floret form, floret substance, length and texture of scape and vigor of bulb and foliage." It was felt that clean color was important but that to grade down a clone because it had smaller-sized flowers than others was a mistake. Many *Amaryllis* fanciers have a high appreciation for some of the smaller blooms. If the bloom was extra large combined with other qualities, one might well be pardoned for grading it a bit higher than the rest.

Floret form and substance was considered important though no strict standard of perfection was set for the form. One is reminded that a hundred years ago in England the camellia flower was thought to be very poor grade if it was not perfectly formal in type. Today this seems ridiculous since all of the forms have admirers. Here, then, the *Amaryllis* bloom was rated in terms of beauty but not graded down because it lacked a certain distinct perfect type form. Most hybrid *Amaryllis* fanciers soon learn to look for the round, flat, "pansy-shaped" forms and this might even be the writer's personal preference. Yet the trumpet shapes are so utterly beautiful that who can say that one is a better form than the other.

As to the length and texture of the stem, it was not given a thought since it was found that a little more nitrogen could produce longer stems in most bulbs. In fact, if any importance were attached to length, one might grade it down for long, leggy stems, an objection one sometimes hears. One might well strive to produce large blooms on short stems the better to display them in pots. It was found that the same bulb could produce 24 inch stems or 3 inch stems with the same sized bloom. For cut flowers, of course, adequate stems are important but this seldom seemed to be lacking.

Concerning the number of scapes per bulb, one wonders if this has anything to do with the size and health of the bulb. It should, however, be taken into account since in the flower market, two scapes on a bulb brings a better price than just one. For personal use it did not seem as important as was the quality of the bloom itself. The number of florets per scape have, possibly, less importance here than in the Manley rating. One reads in Henry Nehrling's paper that *Amaryllis* Leopoldi characteristically had only two florets per scape. One might expect that with this excellent parentage the blooms could occasionally come two to a scape in spite of the bulbs having acquired the ability to put out four to a scape. With their size, more than four to a scape is redundancy. Those who may be displeased with this rating because it focuses too much on the individual floret have some justification for their attitude, I'm sure.

Taking all of the preceding into consideration, the letter ratings are the same as Mr. Manley's, that is AA for Superior, A for excellent, B for good and C for just fair. One is tempted to rate all of the following blooms as AA because like one appreciative *Amaryllis* bulb dealer once wrote me, "Hybrid *Amaryllis* are like Maryland whiskies. It's all

good except some are better than others." The B rating is, than not just average. It means "good" and worth having. The A rating was what might be termed as "tops". The AA rating, then is the one that is hard to resist speaking about in less than extravagant terms.

One often hears discussions or reads about named varieties as to whether or not they are clones or merely collections of similar shades. Having seen how much variation one bulb can give in shade, size and shape from year to year it is the writer's conviction that, at least, three Holland growers are producing named clones. One must allow for the occasional mistake in packing or marking, etc. It is a personal feeling that the Dutch have been so typically industrious in their work and, contrary to the communistic idea, are competitive in their efforts, so that they have contributed much more to the business of getting high quality bulbs to the flower lovers than they receive credit for. The Netherlands must be filled with a warm hearted people to devote so much time to producing better flowers for the rest of the world. May they thrive in this endeavor forever!

WHITE

CASPAR LUDWIG (Ludwig) Grade B minus. Bloomed Dec. 29th. Blooms 5½ inches across. Petals 3″ X 5″. One scape 20 inches long, two blooms. Tubular and did not open well. Soft green in throat for about 2″ and a green line on the keel of each petal posteriorly from base to tip. Bulb only medium in size. It bloomed better the previous year when the bulb was larger in size.

EARLY WHITE (Ludwig) Grade A plus. Eight inches across. Very white with only faint green deep in throat. Four blooms each of two scapes. Outstanding.

MOUNT TACOMA (Warmenhoven) Grade B plus. Large pure white with only moderate green in throat and along keel from base to tip posteriorly. Petals narrow but long and the crinkled margins were well displayed. Two scapes.

QUEEN OF THE WHITES (Warmenhoven) Two bulbs. One Grade C plus and the other C minus. Both bulbs obtained from the same reliable dealer and observed to bloom over a two year period. Obviously not of the same clone. The best one is tubular like an "Easter Lily" with narrow petals hardly touching in places. The other bulb had pink lines in the throat both years it bloomed. All blooms small. Five others owned by Mr. W. E. Rice were observed in bloom and it was agreed that they were all inferior by comparison to other whites. Two to four blooms per scape. Six inches across.

SNOW QUEEN (Ludwig) Grade A. This was nearly pure white with almost no green. Seven and a half inches across.

WHITE GIANT (Ludwig) Grade AA. Extremely handsome. Two blooms of one scape but the previous season, four blooms to each of two

scapes. Eight inches across with wide petals. Flat and round with good substance.

BRIDESMAID (Ludwig) Grade B. Small white. Two scapes, two blooms each.

LUDWIG'S DAZZLER (Ludwig) Grade AA. One is tempted to grade this one triple-A. On two bulbs, two to three scapes per bulb with four florets each. Large flat face. This one had the least green present of any white that was observed. The green was so faded as to be actually a soft yellow just at the center or base of petals in throat. Shapes not always uniform but very graceful. This was the best of the whites in this group.

MARIE GORETTI (Ludwig) Grade AA. Very white with a little cool green in the throat. Form very attractive, possibly because of the delicate appearance brought about by the crenation of petal margins. It surely lived up to its name, suggesting virginity, purity and saintliness. The next best of the whites.

WHITE WITH MARKINGS

W. C. CAMPBELL (W. E. Rice) Grade A plus. Mr. Rice, who has had five acres of hybrid *Amaryllis* under cultivation for a number of years saw fit to name very few clones, in spite of the fact that he had many good blooms. Of these he did name, I believe this one to be his finest. It is full faced, with wide petals but instead of the round pansy shape, each petal is individual even though over-lapping. The white is very white and the upper five petals are marked with two panels of red with central band of white. The two lower anterior petals are marked slightly less than the upper three though the color is brilliant. This one sparkles and glints in the sunlight. The intensity of the red is apt to vary from one bloom to the next. It is altogether a pleasing worth-while bloom. It is such a slow multiplier that it has never been distributed commercially and will probably never be since Mr. Rice has just this year retired from the bulb growing business. He will, naturally, continue to enjoy a few of his own accumulation of bulbs.

"PURE WHITE" (van Tubergen) Grade A plus. The first year this bloomed it was a disappointment since being labelled "pure white", the finding pink markings in the throat was not expected. This last season, however, it came out with such a whopper of a bloom, two to a scape with such an unusual lovely form that it was "out of this world." The petals were long and wavy though well overlapping. Such grace and beauty was not approached in the same way by any other bloom except the MARIE GORETTI. The small pink lines in the throat just made it a bit different and gave it a delicate blush or glow. This was the more odd since the flower was suggestively a faint green over its entire surface even though a white bloom. Difficult to describe other than that it was like the complexion of the medical student's easy girl

friend in the story HUMAN BONDAGE. The girl was afflicted with chlorosis resulting in a peculiar greenish shade to her skin that enslaved the student. Since I had no other white with this appearance, I also was charmed.

"Picotee" (Herman Brown) Grade A. Two bulbs presented to me by that kindly gentleman, Mr. Herman Brown. They were white and almost completely outlined by a reddish pink line which broke in places to punctate accumulations. The form of these were not outstanding yet it is possible that this might improve when the bulbs are better established. Considerable green in throat. These were valued sufficiently high that their pollen was used on all the best whites in order to reproduce and, possibly, improve this strain. These were the best picotees seen.

"Picotee" (Howard & Smith) Grade B. These were better in form and very complete in the picotee though they had large rose-red blotch markings at the mid-petal area. Therefore they were not primarily noticeable as a picotee in the way Mr. Brown's were.

OTHER BICOLORS

ROSE QUEEN (van Meeuwen) Grade AA. This one is a "must" on any collectors list. Two scapes, four blooms, each being 7 inches across. Very white large centers in throat without a blemish of any color other than faint soft green at base of petals. A wide border of vermilion fairly well delineated where it meets center white. Petals tend to be wavy or ruffled but do not recurve or twist out of shape, thereby giving an effect of delicate informal grace yet leaving plenty of face. Petals may double at times giving six, seven or eight petals. A semi-trumpet but very beautiful. This one will make the men turn, look back and whistle.

ROSE

PINK PERFECTION (Ludwig) Grade AA. Old Neyron Rose, Royal Horticultural Chart No. 623. Large 8 inch, flat, round form each year. This had only two blooms to a scape but was from a very small bulb that had been divided five months previously. It seems that this one is very vigorous and had split by fission or cleavage into several equal bulbs about five in all the previous season. In spite of repotting, it went ahead and bloomed. The quality of the single floret rated a double A. Almost the ultimate in the "pansy" round form.

DORIS LILLIAN (Ludwig) Grade AA. Eight inches across. Three scapes from three bulbs were obviously of the same clone. According to the RHS chart, the tips of petals were 722/3, mid-portion

722/1 Cherry. Very clear. No green whatsoever in throat though slightly on base of petals posteriorly. When the flowers age a bit the color changes to Rose Madder RHS 23. Just before the bloom actually starts to fade, multiple small "checks" of actual light blue begin to appear and stand out all over the face. Last year the color looked Magenta but the RHS chart indicated a Tyrian Rose. Since these bulbs were brought to bloom in the coolness of the oceanside, the color is apt to be deeper. More sun with its increased temperature, will lighten the color. This has also been noted to occur on the near-whites where the pink lines are apt to appear in the cooler shade than warmer sunlight. If you like rose, this is another "must."

MORENO (Warmenhoven) Grade A minus. It didn't open well. This was probably not the fault of the bulb since a sudden change of weather (becoming very cold with no sun) at the time seemed to arrest the progress of blooming before it had a chance. Four blooms, one scape. Florets 6½ inches across. RHS 22. Clear except for slight green at base. A second scape was Grade B since, here again, in spite of favorable weather etc., the blooms did not open more than half way. Color of second was Cherry RHS 722/1 at tips and 722/2 at throat. The color and form resemble DORIS LILLIAN. It is hoped that this one will improve as it becomes better established.

SALMON

SWEET SEVENTEEN (Warmenhoven) Grade B plus. Very round, flat, wide petals that begin to recurve slightly at tips accentuating the circular shape after 24 hours. This might better be called a salmon pink. It has a narrow, well defined band of white running from throat to the tip of each petal though on the lowest petal this was not as pronounced. This one was much appreciated by the ladies who saw it but in spite of the excellent qualities of the bloom, the color did not personally appeal to me as much as others. Upper petals RHS Begonia 619/1; lower petals Azalea Pink 618/3 and Vermilion 18/2.

QUEENS PAGE (Warmenhoven) Grade B. Good form. Light salmon, Nice if you like it.

SALMON JOY (Ludwig) Grade A minus. Very flat, round and large. RHS Poppy Red 16. Some adulterating yellowish lines along the throat. Last year it was Manderin Red. One scape, two blooms.

AMERICAN FASHION (Ludwig) Grade A minus. Manderin Red RHS 17. Two yellow stripes on each petal in throat keeps this from being an A plus. Resembles SALMON JOY so much that it might be the same through some error. It was not as described by the grower. Firm broad, flat and very large florets. Stands up well and for a long time. It is still a great beauty.

ORANGE

ORANGE KING (Ludwig) Grade B minus. Didn't open up well. Capsicum red RHS 715. Florets 6 inches across. Clear without green anteriorly. Two blooms to scape. Quite pretty.

PRINCE OF ORANGE. Grade A minus. One scape, two blooms, very round, pansy-shape and flat. Medium size. Petals notched at base. A very fine self.

INVINCIBLE (Ludwig) Grade A plus. Excellent form. Many fine lines veining the petals. Very worth-while.

LIGHT AND MEDIUM RED

MYSTERY. Grade B plus. Delft Rose 020/1 at the tip of petals, Geranium Lake 20 at mid-petal and Current Red 821/2 in center of throat. Brighter in throat and softer at periphery almost to point of dullness. Nearly round and flat with shallow throat. Posterior three petals show a faint rosy lighter colored band along the length of anterior center line from base to tip. Posterior petals 4 inches wide, anterior 3½ inches wide and bloom 7 inches across. Small notch along edge near throat. Outstanding, pleasing form.

DARK REDS AND SCARLETS

BRILLIANT (Ludwig) Grade B. Didn't open too well. Two short scapes of four blooms each.

"van Tubergen Scarlet." Grade B. Signal Red 719/1. Very large and clear. Petals roll back excessively. But for that defect would rate A plus. Two blooms per scape. Two scapes, one being 24 inches and the other 8 inches long.

CHERRY QUEEN (Ludwig) Grade B plus. Signal Red 719/2 changing to Orient Red 819 in throat. Notched petals. Two scapes of 3 to 4 blooms each. Quite clear. Yellow streaks in throat. No green anteriorly but is present posteriorly. Blooms 6½ inches across.

CARDINAL SPELLMAN (Ludwig) Grade B. Signal Red 719/1. Yellow markings in throat. Four blooms on each of two scapes.

BATON ROUGE (Ludwig) Grade B. Two scapes of three small flowers each which opened poorly.

AMERICAN EXPRESS (Ludwig) Grade AA. Cardinal Red RHS822/2. Four blooms per scape. All very clear and of maximum startling brilliance.

QUEEN SUPERIORA (van Meeuwen) Grade B minus. Orient Red 819. Five inch blooms, four to a scape. Florets opened like a

crocus. They all angled up 45 degrees and were notched at base. Two scapes. Very pretty and may do better next time, I'm certain.

LUDWIG'S SCARLET (Ludwig) Grade A plus. Three florets to each of two scapes being 8½ inches across. Clear both front and back but third bloom showed some streaks of dirty-yellow which prevented a grade of double A.

ANNA PAULOWNA (Warmenhoven) Grade A plus. This one is a "knockout". Almost a double A rating.

HALLEY (Ludwig) Grade A. This one is another dark red "knockout" Signal Red 719. Three blooms on one scape.

FRANKLIN D. ROOSEVELT (Ludwig) Grade A. Orient Red 819 to blood red 820. Blooms 7½ inches. Very appropriately named. Not a bit of green anteriorly or posteriorly. An excellent self deep red.

BORDEAUX Grade B minus. Form of this was not as good as others but may do differently next season. Petals narrow enough to see between them. Geranium Lake 20 at tips. Throat deeper than Blood Red 820. Blooms 7½ inches, four to a scape.

All of the above described blooms are worth while. Do not be misled by these ratings. Try them for yourselves and discover that you are apt to rate some blooms as "tops" that are here rated as lesser than the others.

In closing permit me to mention that a similar evaluation published last year in PLANT LIFE under my name contained an amusing error. To those of you who know my wife by her first name, Marie Jassamine, and who have written to me asking who "Edith" was, let me explain. The "Edith" was our esteemed friend, Mrs. Roger Strout, not my wife. The article was but a portion of a "round robin" letter that must have been miscopied. Edith, of course, is a member of that robin.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 28.]

in the tube of the perigonium, the 3 that are opposite the outer segments attached below the middle of the tube, the 3 that are opposite the inner segments attached higher up; filaments slender, pale, glabrous; anthers yellow; ovary ovate, 3 mm. long, 1.5 mm. in diameter, glabrous, green; style rather thick and short, 3 mm. long, minutely and obtusely subtrilobed at the apex; fruit absent.

Sternbergia exscapa Tineo, ined. Gussone, in Fl. Sic. Syn. 384-385. 1842. Leaves narrowly linear, flat, obtuse; spathe radical; corolla segments not known. Grows in sunny mountainsides. Collected by Tineo at Etna and Madonie, Sicily in September and October. Perennial plant; leaves erect, nerveless, shiny-green, 4 mm. wide, bordered at the apex by a thinly membranous margin; spathes radical, scarious, rather obtuse; scape not surpassing the leaves; flowers not seen; capsule elliptic, 3-sulcate, very smooth, 6 mm. long, obtuse with a very short acumen, sup-

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 153.]

AMARYLLIS BARREIRASA

HAMILTON P. TRAUB, *California*

Seeds of an *Amaryllis* L. species were collected in late November 1949 by Dr. Ernesto de Miranda Neto in Brasil in the neighborhood of Barreiras which is situated at the confluence of the upper Rio Grande and Rio Ondas near the western border of the State of Bahia. This

Fig. 6. *Amaryllis barreirasa* Traub, sp. nov. [see description for dimensions]. Photo taken before pedicels had greatly elongated after anthesis.

species begins to bloom at the beginning of the summer rainy season for the region—October through November (southern hemisphere). The local names for our plant are "Flor de Trovão," which translates as

"Thunder Flower," presumably because it tends to bloom at the start of the rainy season, and also "Cebola brava," or "wild onion," apparently because it is a bulbous plant. The seeds were received by the writer via air mail in late December 1949, and excellent germination was obtained. The first plants bloomed on June 22, 1952, about 2½ years after germination [Fig. 6].

The plant is related to *Amaryllis belladonna* L., but is sufficiently distinct to merit specific rank, and has been named *Amaryllis barreirasa* (pronounced bär-reé-ra-sa). The chromosome number is 2n = 22 as reported elsewhere (Traub, 1953, Plate 2-L). The flower is relatively large for the size of the rest of the plant, and there is a conspicuous paraperigone of greenish bristles at the throat. The plant blooms at the beginning of summer (June, in the northern hemisphere) whereas *Amaryllis belladonna* L. blooms in the spring. It is morphologically distinct and is also effectively isolated reproductively from the latter which entitles it specific rank.

Amaryllis barreirasa Traub, **sp. nov.**

Planta bulbosa; bulbo mediocri; foliis usque ad 5 per anthesi non omnino evolutis, statu maturi usque ad 41 cm. longis, ad basin ca. 1 cm. latis, ad ¾ altitudinus 2.5 cm. latis, apice acuto-rotundato; pedunculo 27 cm. alto, post anthesin evoluto; valvis spathae 2 lanceolato-acutis 9.8—10 cm. longis; umbella 4-flora; pedicellis usque ad 5.5 cm. longis post anthesin evolutis; ovario 1.2 cm. longo; tubo tepalorum 3.1 cm. longo; perigonio patente subplano 18 cm. diametro; segmentis tepalorum in parte 1/3 inferiori macula irregulari subviridialbida ornatis, partibus superioribus inter begoniinis et roseis porcellanis coloratis; paraperigonio in gula setis subviridibus constato; segmentis setepalorum obovatis 10—10.5 cm. longis, 5—6 cm. latis; segmentis petepalorum elliptico- usque ad unguiculato-lanceolatis 9.5—10 cm. longis, 2.5—4 cm. latis; staminibus styloque declinato-adscendentibus, e perigonio non exsertis; stylo ultra stamina 1.1 cm. prolato; stigmate capitato.

Description.—*Chromosome number*, 2n = 22 (Traub, 1953, Plate 2-L); *bulb* medium sized; *leaves* up to 5, not fully developed at time of flowering in type, and may therefore not be contemporary with the flowers in the native habitat, up to 41 cm. long when mature, about 1 cm. wide at the base, 2.5 cm. wide ¾ from base, apex acute-rounded; *peduncle* 27.0 cm. tall, elongating after anthesis to 44 cm. tall, 1.2 x 2.1 cm. at base, 1 x 1.3 cm. at apex; *spathe-valves* 2, free, lanceolate-acute, 9.8—10 cm. long; *umbel* 4-flowered; *pedicels* reddish-*greenish*, varying from very short up to 5.5 cm. at anthesis of the first flower, elongating greatly after anthesis to 14.5—16.5 cm. long; *ovary* 1.2 cm. long, 5.5 mm. diam. at base, 6.5 mm. diam. at apex; *tepaltube* 3.1 cm. long, 5 mm. diam. at base, 1.2 cm. diam. at apex; *perigone* wide open, almost flat, 18 cm. across face, irregular greenish-whitish area in lower 1/3 of tepalsegs, upper portions between Begonia (RHS 619) and

Porcelain Rose (RHS 620); *paraperigone* of conspicuous greenish bristles at the throat; *setepalsegs* obovate, 10-10.5 cm. long, 5-6 cm. wide; *petepalsegs* elliptic- to unguiculate-lanceolate, 9.5-10 cm. long, 2.5-4 cm. wide; *stamens* and *style* declinate-ascending not exserted from the perigone; *style* extending 1.1 cm. beyond stamens; *stigma* capitate; *capsule* 2.1 cm. long, 3.9 cm. wide, distinctly trilobed, lobes extending below center by 7 mm.; *seeds* numerous, winged, discoid to D-shaped, black, 1.5 x 2.2 cm. Type: Traub Nos. 210 and 211, in the Traub Herbarium; type illustration: Fig. 6.

LITERATURE CITED

in combined staining and mounting media. Euclides *13:* Plate 2-K-L. 1953.

AMARYLLIS APERTISPATHA

HAMILTON P. TRAUB, *California*

On August 17, 1940, Mr. Mulford B. Foster collected a stoloniferous *Amaryllis* L. species (Foster No. 972; Traub No. 110) at an altitude of 1200 ft., on granite rocks, in Cachoeiro de Itapemirim, State of Espirito Santo, Brasil. Some of the bulbs were given to Mrs. Mary G. Henry who gave some of the increase to the writer in 1944. They flowered for him in 1952 [Plate 9].

This is one of the most distinct species on the basis of chromosome number since it is the first hexaploid *Amaryllis* L. species (2n = 66) discovered as reported elsewhere (Traub, 1953, Plate 2-A). This was first suspected when it was found that it would not cross with other species, but was self fertile, a condition rarely met with an *Amaryllis* L. species, which are usually self sterile but will set seeds by close pollination, that is by crossing different seedlings. The species is also morphologically very distinct since it is the only species with green spathe valves that are open from the start, resembling shorter true leaves, and which remain green even after the seeds have ripened. It blooms later (late May and June) than *Amaryllis belladonna* L. which it resembles somewhat in flower shape.

Amaryllis apertispatha Traub, **sp. nov.**

Planta bulbosa; foliis 3—5, lorato-lanceolatis usque ad 31 cm. longis, ad basin 1 cm. latis, ad 2/3 altitudinis 2.5 cm. latis, apice acuto; pedunculo usque ad 30.6 cm. alto, post anthesin evoluto; umbella 2- vel 3-flora; valvis spathae viridibus non clausis, foliis brevioribus oblanceolato-acutis

Amaryllis apertispatha Traub, sp. nov. [see description for dimensions.] Photo taken before pedicels had elongated after anthesis.

Plate 9

consimilibus, usque ad 9.5 cm. longis, ad basin 1.1 cm. latis, ad ¾ altitudinis 2 cm. latis, donec post maturitatem seminorum viridibus; tubo tepalorum 2.7 cm. longo; pedicellis usque ad 3 cm. longis, post anthesin evolutis; paraperigonio in gula setis paucis albidis constato; perigonio in gula viridi-albidis, reliquo inter begoniinis et roseis porcellanis colorato; segmentis tepalorum oblanceolato-acutis vel lanceolato-acutis usque ad lanceolatis 7.8—7.9 cm. longis, 1.8—3.6 cm. latis; staminibus styloque declinato-adscendentibus, stylo paullo ultra stamina prolato; stigmate capitato per indistincte trifido.

DESCRIPTION.—*Chromosome number* 2n = 66 (Traub, 1953, Plate 2-A); bulb relatively small for the genus; *leaves* 3—5, lorate-oblanceolate, slightly concave, up to 31 cm. long, 1 cm. wide at base, 2.5 cm. wide 2/3 from base, apex acute; *peduncle* up to 30.6 cm. tall at anthesis, elongating after anthesis, slightly compressed, edges rounded, up to 1.7 x 1.1 cm. at base, 1.1 x 0.9 cm. at apex; *spathe-valves* 2, free, green, open from the start, resembling shorter oblanceolate-acute leaves, margin infolded, up to 9.5 cm. long, 1.1 cm. wide at base, 2 cm. wide 2/3 from base, remaining green after anthesis for a relatively long time until after seeds have ripened; umbel 2—3-flowered; *pedicels* up to 3 cm. long, elongating after anthesis; *ovary* 1.5 x 0.7 cm. diam. at anthesis; *tepaltube* up to 2.7 cm. long, 0.6 cm. diam. at base, 1.3 cm. diam. at apex; *perigone* greenish-whitish in the throat region, the rest between Begonia (RHS 619) and Porcelain Rose (RHS 620); *paraperigone* of a few whitish bristles at the throat; *tepalsegs* oblanceolate-acute, lanceolate-acute, to lanceolate, 7.8—7.9 cm. long, 1.8—3.6 cm. wide; *stamens* and *style* declinate-ascending; *style* extended slightly beyond the stamens; *stigma* capitate, very obscurely trifid; *capsule* trilobed; seeds discoid to D-shaped, black. Type: Traub Nos. 207, 208 and 209, in the Traub Herbarium; type illustration: Plate 9.

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Traub, Hamilton P. Arabinic acid, a new non-precipitating ingredient in combined staining and mounting media. Euclides *13:* Plate 2-A. 1953.

THE GENERA **RHODOPHIALA** PRESL, **PHYCELLA** LINDL., AND **AMARYLLIS** L.

HAMILTON P. TRAUB, *California*

I. RHODOPHIALA PRESL

The small-flowering species of the genus *Amaryllis* L. as recognized by Baker (1888)—the subgenera *Chilanthe* Traub (Traub & Moldenke, 1949), and *Rhodophiala* (Presl) Baker, differing only in the nature of the stigma (trifid vs. capitate)—had been reduced to this position by Baker (1888) on a morphological basis alone. In a recent paper (Traub, 1952), it was shown that the species of these small-flowering subgenera with a basic chromosome complement of n = 9, differ on a cytological basis from the typical large-flowering members of the genus *Amaryllis* L. (type: *Amaryllis belladonna* L) with a basic chromosome complement of n = 11. This basic difference is also reflected in breeding experiments (Traub, 1952) which show that crosses are possible between the small-flowering species and *Habranthus juncifolius* Traub which in turn crosses with ZEPHYRANTHES *grandiflora* Lindl., but attempted crosses between the small-flowering and the large-flowering *Amaryllis* L. species uniformly fail. This points to the untenable nature of Baker's disposition of the small-flowering species, and therefore the genus *Rhodophiala* Presl has been restored (Traub, 1952). This means also that the genus *Amaryllis* L., now confined to 45 species, becomes again a very homogeneous group (taxon) with 57.8% of the species originally described under the generic name *Amaryllis* L. (See Table 1.).

In restoring the genus *Rhodophiala* Presl, Traub (1952) indicated that the type of this genus is *Rhodophiala amarylloides* Presl (Bot. Bemerk. 115. 1844) which is a synonym of *Rhodophiala pratensis* (Poepp.) Traub. The genus *Rhodophiala* Presl was recognized by R. A. Philippi who proposed six additional species under that name, but three of these are now recognized as synonyms. The three valid species are *Rhodophiala biflora* R. A. Phil., *R. modesta* R. A. Phil., and *R. uniflora* R. A. Phil. The following new combinations are required to bring the subject up to date so as to accord with the *biologic facts:*

Rhodophiala consobrina (R. A. Phil.) Traub, *comb. nov.* (syn.—*Hippeastrum consobrinum* R. A. Phil., in Anal. Univ. Chile *93:* 52. 1896.). *Rhodophiala tiltilensis* (Traub & Moldenke) Traub, *comb. nov.* (syn.—*Amaryllis tiltilensis* Traub & Moldenke, Tribe Amaryll. 88. 1949.). *Rhodophiala tenuiflora* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Hippeastrum tenuiflora* R. A. Phil., in Anal. Univ. Chile *93:* 154. 1896.). *Rhodophiala moelleri* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Hippeastrum moelleri* R. A. Phil., in Anal. Univ. Chile *93:* 154. 1896.). *Rhodophiala berteroana* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Habranthus berteroanus* R. A. Phil., in Linnaea *29:* 66. 1857-58.). *Rhodophiala bagnoldii* (Herb.) Traub, *comb. nov.* (syn.—*Habranthus bagnoldii* Herb., Bot. Reg. Lond. *17:* pl. 1396. 1831.).

Rhodophiala ananuca (R. A. Phil.) Traub, *comb. nov.* (syn.—*Hippeastrum ananuca* R. A. Phil., in Anal. Univ. Chile *93:* 150. 1896.). *Rhodophiala bakeri* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Habranthus bakeri* R. A. Phil., in Anal. Univ. Chile *93:* 150. 1896.). *Rhodophiala advena* (Ker-Gawl.) Traub, *comb. nov.* (syn.—*Amaryllis advena* Ker-Gawl., Bot. Mag. Lond. *28:* pl. 1125. 1808.). *Rhodophiala jamesonii* (Baker) Traub, *comb. nov.* (syn.—*Hippeastrum jamesonii* Baker, in Jour. Bot. (Lond.) *16:* 83. 1878.). *Rhodophiala bifida* (Herb.) Traub, *comb. nov.* [See Plate 10.] (syn.—*Habranthus bifidus* Herb., Bot. Mag. Lond. *52:* pl. 2597. 1825.). *Rhodophiala araucana* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Hippeastrum araucanum* R. A. Phil., in Anal. Univ. Chile *93:* 152-153. 1896.). *Rhodophiala splendens* (Renjifo) Traub, *comb. nov.* (syn.—*Habranthus splendens* Renjifo, in Renjifo & Phil., Descr. Alg. Pl. Nuev. reimpr. 6. 1884.). *Rhodophiala soratensis* (Baker) Traub, *comb. nov.* (syn.—*Hippeastrum soratense* Baker, Amaryll. 42. 1888.). *Rhodophiala chilensis* (L'Herit.) Traub, comb. nov. (syn.—*Amaryllis chilensis* L'Hérit., Sert. Angl. 11. 1788.). *Rhodophiala lineata* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Habranthus lineatus* R. A. Phil., in Anal. Univ. Chile *43:* 542. 1873.). *Rhodophiala elwesii* (C. W. Wright) Traub, *comb. nov.* (syn.—*Hippeastrum elwesii* C. W. Wright, in Kew Bull. 330. 1914.). *Rhodophiala andicola* (Poeppig) Traub, *comb. nov.* (syn.—*Amaryllis andicola* Poeppig., Fragm. Syn. Pl. Phan. 5. 1833.). *Rhodophiala rosea* (Sweet) Traub, *comb. nov.* (syn.—*Habranthus roseus* Sweet, Brit. Fl. Gard. ser. 2. *2:* pl. 107. 1833.). *Rhodophiala flava* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Habranthus flavus* R. A. Phil., in Anal. Univ. Chile *27:* 333. 1865.). *Rhodophiala montana* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Habranthus montanus* R. A. Phil., in Anal. Univ. Chile *43:* 543-543. 1873.). *Rhodophiala fulgens* (J. D. Hooker) Traub, *comb. nov.* (syn.—*Habranthus fulgens* J. D. Hooker, in Bot. Mag. Lond. *92:* pl. 5563. 1866.). *Rhodophiala pratensis* (Poeppig) Traub, *comb. nov.* (syn.—*Amaryllis pratensis* Poeppig, in Fragm. Syn. Pl. Phan. 5. 1833.). *Rhodophiala gladioloides* (Hieron.) Traub, *comb. nov.* (syn.—*Habranthus gladioloides* Hieron., in Bol. Acad. Nac. Cien. Cordoba *4:* 70. 1881.). *Rhodophiala colonia* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Hippeastrum colonum* R. A. Phil., in Anal. Univ. Chile *93:* 148. 1896.). *Rhodophiala rhodolirion* (Baker.) Traub, *comb. nov.* (syn.—*Hippeastrum rhodolirion* Baker, Jour. Bot. Lond. *16:* 84. 1878.). *Rhodophiala popetana* (R. A. Phil.) Traub, *comb nov.* (syn.—*Hippeastrum popetanum* R. A. Phil. in Anal. Univ. Chile *93:* 150. 1896.). *Rhodophiala purpurata* (R. A. Phil.) Traub, *comb. nov.* (syn.—*Hippeastrum purpuratum* R. A. Phil., in Anal. Univ. Chile *93:* 156. 1896.).

EDITORIAL POSTSCRIPT.—The new combination, **Rhodophiala pratensis** (Poepp.) Traub, was first published in Taxon **1:** 122. 1952. The new combination, **Rhodophiala bifida** (Herb.) Traub, was first published in Euclides **13:** 156. 1952. Plate 10 on page 61 has been reproduced from Bot. Mag. Lond. **53:** pl. 2597. 1825.

II. PHYCELLA Lindl.

Baker (1878; 1888) reduced the genus *Phycella* Lindl. to a subgenus of *Amaryllis* L. (syn.—*Hippeastrum* Herb.). This disposition was always questionable. Further study of the plants accommodated under the subgenus *Phycella* (Lindl.) Baker (Traub & Moldenke, 1949) indicated that morphologically this group is near to *Eustephia* Cav. as previously indicated by Stapf (1927). *Phycella* Lindl. is therefore restored and is placed next to *Eustephia* Cav. in the sub-family *Pancratioideae* (1953). Two of the species included were originally described under *Phycella* Lindl.,—*Phycella herbertiana* Lindl., and *Phycella angustifolia* R. A. Phil. One new combination was made by Herbert, *Phycella bicolor* (Ruiz & Pav.) Herb. The four necessary new combinations to bring the subject up to date to accord with the biologic facts follow:

Phycella phycelloides (Herb.) Traub, comb. nov. (syn.—*Habranthus phycelloides* Herb. in Bot. Reg. Lond. *17:* pl. 1417. 1831.). *Phycella bonariensis* (O. Kuntze) Traub, *comb. nov.* (syn.—*Hippeastrum bonariensis* O. Kuntze, Rev.

Rhodophiala bifida (Herb.) Traub. This species is widely cultivated in the United States under the name, **Amaryllis advena** Ker-Gawl.

Plate 10. (See Editorial Postscript on page 60.)

Gen. Pl. *3(3):* 311. 1898.). *Phycella gayana* (O. Kuntze) Traub, *comb. nov.* (syn.—*Hippeastrum gayanum* O. Kuntze, Rev. Gen. Pl. *3(3):* 311. 1898.). *Phycella granatiflora* (Holmb.) Traub, *comb. nov.* (syn.—*Hippeastrum granatiflorum* Holmb., in Anal. Mus. Buenos Aires, ser. III. *2:* 79—80. 1903.).

III. AMARYLLIS L.

With the transference of the extraneous elements elsewhere to accord with the biologic facts (Traub, 1953), the genus *Amaryllis* L. is restored as a very homogenous taxon as originally typified by Herbert (Herbert, 1819; Traub & Moldenke, 1949, pp. 68—72.). The genus *Amaryllis* L. thus consists of 45 species. These were originally described under the genera indicated in Table 1.

Table 1

Described under:	Number of species	Per cent of total:
Amaryllis L. (1753)	26	57.8%
Hippeastrum Herb. (1821)	17	37.8%
Sprekelia Heist. (1755)	1	2.2%
Griffinia Ker-Gawl. (1820)	1	2.2%

The species of *Amaryllis* L. as recognized are listed alphabetically in Table 2 as they appear in the writer's monograph (Traub, 1953) on the *Amaryllidaceae* on which he has worked for over 30 years and which is now being prepared for the printer.

Table 2

Amaryllis aglaiae Castellanos
Amaryllis andreana (Baker) T & U
Amaryllis angustifolia (Pax) T & U
Amaryllis apertispatha Traub
Amaryllis aulica Ker-Gawl.
Amaryllis barreirasa Traub
Amaryllis belladonna L.
Amaryllis blumenavia (C. Koch et Bouché ex Carr.) Traub
Amaryllis breviflora (Herb.) Seub.
Amaryllis cantraii (Arech.) T & U
Amaryllis calyptrata Ker-Gawl.
Amaryllis correiensis Bury
Amaryllis crociflora (Rusby) T & U
Amaryllis cybister (Herb.) T & U
Amaryllis damaziana (Beauverd) T & U
Amaryllis elegans Sprengel
Amaryllis espiritensis Traub
Amaryllis ferreyrae Traub
Amaryllis flammigera (Holmb.) T & U
Amaryllis forgetii (Worsley) T & U
Amaryllis fosteri Traub
Amaryllis fusca (Kraenzl. T & U
Amaryllis harrisonii Lindl.
Amaryllis immaculata T & M
Amaryllis kromeri Worsley
Amaryllis leopoldii T. Moore
Amaryllis mandonii (Baker) T & U
Amaryllis maracasa Traub
Amaryllis miniata Ruiz & Pav.
Amaryllis moreliana (Lem.) Traub
Amaryllis oconequensis Traub
Amaryllis pardina Hook. f.
Amaryllis petiolata (Pax) T & U
Amaryllis psittacina Ker-Gawl.
Amaryllis reginae L.
Amaryllis reticulata L'Hérit.
Amaryllis scopulorum (Baker) T & U
Amaryllis striata Lamarck
Amaryllis stylosa (Herb.) Sweet
Amaryllis traubii Moldenke
Amaryllis tucumana (Holmb.) T & U
Amaryllis vanleestenii Traub
Amaryllis viridiflora (Rusby) T & U
Amaryllis viridorchida Traub
Amaryllis vittata L'Hérit.

* Originally described under the name *Amaryllis L.*

It should be emphasized that 57.8% of the species were originally described under the genus *Amaryllis* L., and any required new combinations have been made in the past, and all of the names included above under *Amaryllis* L. are recognized and used by those who have specialized on this group for many years (HERBERTIA, 1938—1948; PLANT LIFE, 1949 to the present; published by The American Plant Life Society, 26 E. Camino Real, Arcadia, Calif.).

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Traub, Hamilton P. *Amaryllidaceae* (Subfamilies, tribes, genera and species). Monograph in prep. for printer, 1953.
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[Howard—CRINUM SCABRUM, continued from page 94.]

With all of its fine qualities, one wonders why the plant is not more widely known and grown. Although *Crinum scabrum* increases slowly by offsets, it can rapidly be increased by seeds. It sets seed freely and is very valuable in hybridization. *Crinum scabrum* crossed with the hybrid *Crinum* ELLEN BOSANQUET has produced a hybrid reportedly darker than the wine-rose ELLEN BOSANQUET.

The culture is similar to that of other crinums, that is, just barely covering the bulb completely with soil. It is often suggested that crinums should be planted with most of the bulb protruding above ground. This is all well and good where there is no danger of frost. There are few areas in the South where a hard freeze does not occasionally occur. Many years of mild winters may be followed by a highly damaging winter in which great losses in plants results. The writer has never condoned too shallow planting, and after experiencing two unusually severe winters in which the thermometer hovered around the zero mark for a week, I am convinced that exposing too much of a *Crinum* bulb above the surface can be disastrous. The bulb should be completely covered to the neck of the plant. Since the large bulb of *C. scabrum* has a short neck, the bulb should not be exposed above the surface as it is a tender species. It prefers a sandy soil with an acid pH, but it is fairly tolerant to heavier, slightly alkaline soils. It grows best in full sun, but the flowers keep better in part shade.

ALLIUM TANGUTICUM

RAYMOND B. FREEMAN, *Illinois*

Allium tanguticum is an excellent garden allium of the simplest culture. It has much to recommend it. First, it is a good clear reddish purple color. The umbel is almost a perfect sphere, and the projecting stamens add a pleasant "fuzziness" to this severe geometric shape. Second, the umbels are carried on stiff, strong stems about $2\frac{1}{2}$ to 3 feet high. These stems resist wind very well. Third, the narrow twisted strap leaves are short and do not detract from the floral display. Fourth,

Fig. 7. *Allium tanguticum* Regel as grown in Illinois. Photo by Raymond B. Freeman.

it blooms in August, covering almost the entire month, and under favorable conditions has some bloom in early September.

This species is very easy from seed planted outdoors in the early spring. The clump illustrated (Fig. 7) was transplanted to its permanent location the second spring. As can be seen, it is atop a low wall, hence has very good drainage; although this may not be essential it certainly does no harm. The soil is a neutral clay loam. There is no particular culture given. The location receives sun most of the day. The plants have never been watered artificially. It is this adaption to the mid-West climate that is one of the virtues of this species.

Specimen blooms of this allium have been entered in local flower shows where they invariably excite comment.

AMARYLLIS BELLADONNA VAR. BARBATA

MARY G. HENRY, *Pennsylvania*

Anyone who has ever seen *Amaryllis belladonna* var. *barbata* [Fig. 8] in bloom will surely agree that it is the very quintessence of beauty.

Fig. 8. *Amaryllis belladonna* var. *barbata* in flower. Photo by Mary G. Henry.

The color of the flowers is an entrancingly lovely cream that deepens a little towards the center before it merges into the pale green heart of the flower. They have a sort of waxy texture with a fine velvety finish which fairly glistens when the sun's rays fall on the tepalsegs. The flowers are large, very large for the size of the bulbs, about 12.5 cm. in diameter, and rather informal in shape. The petepalsegs are prettily wavy or slightly ruffled along the edges which gives a very graceful and

elegant appearance to the flower. The reverse of the setepalsegs is the same in color excepting that, sometimes, they are slightly stained reddish along the keel. Although this does not show through, the flowers without it are the most attractive. It is the pristine purity of its luscious creamy coloring that is its great charm. The flowers are held on about a 25 cm. stalk which may be a little taller if grown in part shade. Three-flowered umbels are commonly produced, but they do make four flowered umbels too.

Fig. 9. *Amaryllis belladonna* var. *barbata* after shedding seeds. Photo by Mary G. Henry.

The 4-8 evergreen leaves are of rather a distinct light yellowish green color that sets off to perfection the creamy flowers.

Unlike the undoubtedly handsome and very magnificent huge Dutch hybrid *Amaryllis* which seem to require a store window, a table in a flower show or an immense room to properly set off their noble proportions. *Amaryllis belladonna* var. *barbata* is of a convenient size for the windowsill of even a small room and a large specimen composed of 4-6 bulbs could trim a palace window.

A 4½ inch pot is a convenient size for one bulb, but with good soil and a little fertilizer it can contain two flowering bulbs. In spite of the rather fragile appearance of this *Amaryllis* it is not difficult to grow when its needs are understood and it is given the soil mixture and culture it requires. Coming from its home where it lives on sandy shell mounds it should have a sandy soil with leaf soil and crushed oyster shell well mixed into it. The bulbs which are about 5 cm in diameter should be buried to their necks.

If I could grow but three or four *Amaryllis, Amaryllis belladonna* var. *barbata* would surely be one of the first I would choose, not only for its distinctiveness but also for its utter perfection of form and color, and sheer ethereal beauty.

For a technical description of *Amaryllis belladonna* and its varieties see Dr. Traub's Amaryllidaceae, page 122. *Amaryllis belladonna* var. *barbata* was lost to cultivation when Mr. Foster collected it again a few years ago (see Herbertia 1951, page 17). The plants illustrated in Figs. 8 and 9 were recently obtained from Surinam through the kindness of Mr. van Leesten.

THE TRAUB - USDA DAYLILIES

STANLEY E. SAXTON, *New York*

In September 1950 plants of 15 daylily clones were received from the U. S. Plant Industry Station, Beltsville, Maryland, for commercial propagation. Some of the clones received were small clumps which could be divided and this was done so that the divisions set out were single fan plants in most cases.

The table below shows the number of divisions planted, and the total number of fans as of the date of this report.

Also indicated is type of foliage growth: Evergreen (Ev.) Deciduous (D); Semi-evergreen (SE).

Name	*Planted*	*Fans now*	*Foliage*
1. Clarinda	4	22	Ev.
2. Emily Dickinson	5	20	Ev.
3. Gita	2	5	SE
4. Golden Triangle	2	4	SE
5. Iowa	2	7	Ev.
6. Krishna	1	8	Ev.
7. Lemon Tulip	2	4	SE
8. Mary Henry	3	13	Ev.
9. Mitza	3	8	SE
10. Purity	3	12	SE
11. Reinbeck	2	10	Ev.
12. Saffron Queen	2	6	Ev.
13. Stephan Foster	2	2	SE-D
14. Susannah	1	3	SE
15. Papagaio	1	4	D

Remarks: Almost all of these varieties are evergreen or show some growth in winter here. This has not seemed to retard development as those with the greatest percentage increase are evergreen (KRISHNA). STEPHAN FOSTER which is almost deciduous has been the slowest grower of all which is a surprise. The average increase in two years of growth is 4 fans for one. This is rather slow, but compares generally with evergreen types under the northern New York conditions. It should also be remembered that increase the first year is in almost all cases negligible as it takes that length of time for evergreen clones to become adapted to the long rest period and winter cold. However, not a single division was winter killed, although some were very weak the spring after planting. All are healthy now.

It is still too early to attempt to give a final evaluation of the flowers. Most of the varieties have bloomed and the one that appeals most to the writer is MARY HENRY. This is a large clear yellow flower, ruffled, fragrant and on fairly tall stems up to 4 feet high. The branching is good but this may be even improved later as the plants develop.

REINBECK is a very appealing flower with its overcast of rose-pink. STEPHEN FOSTER is a garnet red with marked midrib—not as true a red as BERWYN but intense. KRISHNA is the deepest in color, a maroon-purple. EMILY DICKINSON is large and attractive in a light shade of canary.

More visitors asked about GOLDEN TRIANGLE than any other. This has a large flower of unusual and appealing form but its slow natural increase slows down its propagation in the North unless the cuttage method of propagation is employed.

Further comments will be made after another flowering season.

AMARYLLID NOTES

HAMILTON P. TRAUB

Leucopum nebrodense (Lojac.) Traub, *comb. nov.*, (syn.—*Erinosma nebrodense* Lojac., Flora Sicula *3:* 80, pl. 5, fig. 4. 1908.)

x*Amaryllis gladwynensis* AND PARENTS. A further study of the progeny of x*Amaryllis gladwynensis* [*Amaryllis belladonna* var. *haywardii* x x*Amaryllis johnsonii* (Naga Hills, India clone)] a hybrid produced by Mrs. Mary G. Henry (Plant Life 8: 86. 1952) shows that the scapes are 2, 3 and 4-flowered, the flower color ranges from scarlet, crimson to pink. Most of the seedlings are robust; showing hybrid vigor. The variation in flower color shows that the pollen parent is not a true x*Amaryllis johnsonii (Amaryllis reginae* x A. *vittata).* Mrs. Henry has selfed x*Amaryllis johnsonii* (Naga Hills clone), but the seed-

lings have not as yet flowered. When they do flower, more information about the pollen parent will be available.

Genus CASTELLANOA Traub, *nom. nov.* (syn. genus *Sanmartina* Traub, in Plant Life 7 : 41—42. 1951, non *Sanmartinia* Buchinger, 1950) ; typus : *Castellanoa marginata* (R. E. Fries) Traub, *comb. nov.* (syn.—*Hippeastrum marginata* R. E. Fries, Act. Soc. Upsal. ser. 4, 1(1) : 161, pl. 9, figs. 3 & 4. 1905).

Ipheion patagonicum (Baker) Traub, *comb. nov.* (syn.—*Milla patagonica* Baker, in Jour. Linn. Soc. Bot. 11 : 382. 1871.). *Ipheion luzula* (Speg.) Traub, *comb. nov.* (syn.—*Luzula patagonica* Speg., in Rev. Fac. Agron. Vet. La Plata 3 : 577—578. 1897.; *Brodiaea luzula* (Speg.) Mackloskie, in Rept. Princeton Univ. Exped. Pat. 8 : 305. 1903-1906.). *Ipheion bivalve* (Lindl.) Traub, comb. nov. (syn.—*Triteleia bivalvis* Lindl., in Bot. Reg. sub pl. 1293, in nota. 1830). *Ipheion violaceum* (Kunth) Traub, *comb. nov.* (syn.—*Triteleia violacea* Kunth, Enum. 4 : 468. 1843). *Ipheion poeppigianum* (C. Gay) Traub, *comb. nov.* (syn.—*Triteleia poeppigiana* C. Gay, in Fl. Chil. 6 ; 117. 1853.). *Ipheion nivale* (Poeppig) Traub, *comb. nov.* (syn.—*Tristagma nivalis* Poeppig, in Nov. Gen. 2 : p. 28, pl. 140.). *Ipheion porrifolium* (Poeppig) Traub, *comb. nov.* (syn.—*Triteleia porrifolia* Poeppig, in Nov. Gen. 2 : p. 28, pl. 139.). *Ipheion brevipes* (Kunze) Traub, *comb. nov.* (syn.—*Triteleia brevipes* Kunze, in Linnaea 20 : 9. 1847 ; *Milla leichtlinii* Baker, in Gard. Chron. 1(1875)234 ; Bot. Mag. 102 : pl. 6236. 1876.). *Ipheion gracile* (Philippi) Traub, *comb. nov.* (syn.—*Triteleia gracilis* R. A. Phillipi, in Anal. Univ. Chile 550. 1973.). *Ipheion sessile* (Philippi) Traub, *comb. nov.* (syn.—*Triteleia sessilis* Philippi, in Linnaea 29 : 72. 1857-1858.). *Ipheion setaceum* (Baker) Traub, *comb. nov.* (syn.—*Milla setacea* Baker, in Jour. Linn. Soc. Bot. 11 : 385. 1871.). *Ipheion recurvifolium* (C. H. Wright) Traub, *comb. nov.* (syn.—*Brodiaea recurvifolia* C. H. Wright, in Bull. Misc. Infor. Kew, p. 117. 1915.). *Ipheion circinatum* (Sandwith) Traub, *comb. nov.* (syn.—*Brodiaea circinata* Sandwith, in Hooker's Ic. Pl. 5th ser. 4 : pl. 3350. 1837.). *Ipheion spegazzinii* (Macloskie) Traub, *comb. nov.* (syn.—*Brodiaea spegazzinii* Macloskie, in Rept. Princeton Univ. Exped. Pat. 8 : 305. 1903-1906.). *Ipheion ameghinoi* (Speg.) Traub, *comb. nov.* (syn.—*Brodiaea ameghinoi* Speg., in Rev. Fac. Agron. Vet. La Plata 3 : 575-576. (1897.). *Ipheion viridor* (Killip) Traub, *comb. nov.* (syn.—*Brodiaea viridor Killip,* in Jour. Wash. Acad. Sci. 18 : 566. 1926.).

Milla coerulea Adolf Scheele, Linnaea *25:* 260—261. 1852. Native to Texas ; near New Braunfels ; in colonies on dry prairie. Cites an herbarium specimen by "Roemer, March".

Milla biflora Cav., Adolf Scheele, in Linnaea *25:* 261. 1852. Attributes this species to Texas, but cites no herbarium specimen, and no locality.

Eustephia jujuyensis Hort. ex Traub, in Plant Life *6:* 61. 1950 (err. *yuyuyensis).* Dr. A. Castellanos writes that the correct spelling of the name of the Argentine Province is "Jujuy" and thus the former spellings "yuyuyensis" and "yuyuensis" were incorrect as specific epithets.

SMALL'S *Hymenocallis* TYPE SPECIMENS. It has not been possible to locate most of these, but fortunately, one, *Hymenocallis tridentata* Small, S. E. Flora. 323, 1503. 1933, *nomen subnudum*, has been located through the kindness of Dr. David D. Keck of the New York Botanical Garden. Unfortunately, the herbarium specimens at the New York Botanical Garden are not numbered, making it difficult to find and to cite such specimens. In this case Small apparently collected the plant alive when not in flower in Dec. 1920, the date he gives on the label. Apparently he flowered the plant subsequently in the NYBG propagation house in March 1922, when he made the incomplete type description, and also made a painting from the living plant. This painting has not been located. Small's original description *is incomplete* in some particulars, and *erroneous as to the shape of the leaves* which are "linear-lanceolate," and not "linear" as he states. The revised description—*Hymenocallis tridentata* Small, *emend.*—based on the type specimen and Small's incomplete type description, follows:

Bulb unknown, leaves 5, linear-lanceolate, up to 4 [-5] dm. long, up to 9 mm. at the base, 1.6 cm. at the middle, apex acute, somewhat channeled, keeled beneath, deep green; spring flowering (type plant, March 8, 1922); scape about 3 dm. tall, 2-edged, glaucescent; umbel 2-flowered; spathe-valves 2, free, 7 mm. wide at the base, tapering to a narrow blunt apex, 5.2 cm. long; bracteoles 2, similar, smaller, almost as long as the spathe-valves; flowers white, fragrant, ovary sessile, 1.2 cm. long, number of ovules per locule unknown; tepaltube 5.5—6.4 cm. long; tepalsegs narrow, about 8—8.5 cm. long; staminal cup 5.5—6.5 cm. wide, usually 3-toothed, the middle one the largest, *sometimes up to 6-toothed*, between the filaments; free portion of the stamens 1.7 cm. long; style slightly longer than the stamens, stigma faintly 3-lobed; fruit and seeds unknown.

Range.—Florida, Vero; *Small*, collected Dec. 1920; flowered March 8, 1922, NYBG (type), in Herb. NYBG. According to Small (1933), the range is "Peninsular Florida; swamps and marshes, east coast region," but no citations of specimens, other than the one indicated, are given to back up this statement.

Notes.—According to Small (1933) this species is "conspicuous on account of the very large toothed staminal cup."

REGISTRATION OF NEW AMARYLLID CLONES

Registrars: Dr. J. B. S. Norton and Prof. W. R. Ballard

This information is published to avoid duplication of names, and to provide a space for recording brief descriptions of new Amaryllid clones. Names should be as short as possible—one word is sufficient. It is sug-

gested that in no case should more than two words be used. *The descriptions must be prepared in the form as shown in the entries below, and must be typewritten and double-spaced.* The descriptive terms used should be in harmony with those given in the "Descriptive Catalog of Hemerocallis Clones, 1893-1948" by Norton, Stuntz and Ballard.

There is close liaison between the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY regarding the registration of new *xHemerocallis* clones. By cooperative arrangement with the HEMEROCALLIS SOCIETY, beginning with the 1951 HERBERTIA edition, descriptions of only such *xHemerocallis* clones for which the registration fee has been paid to Registrar, Mr. Harry I. Tuggle, P. O. Box 1108, Martinsville, Va., will be registered, and numbered (example: 3322-R). The number "3322" indicating the number of the clone and the "R," the information that it is registered. The registration fee is required *only* in the case of *xHemerocallis* clones, and *not* for other amaryllids which are registered free of charge by the AMERICAN PLANT LIFE SOCIETY. It should be noted that in a free country such as ours, registration is *entirely voluntary,* and does not replace the right of anyone to publish names with descriptions in recognized publication media elsewhere and thus obtained priority under the generally recognized INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE which covers all plant names.

Correspondence regarding new amaryllid clones, including *Hemerocallis,* to appear in HERBERTIA should be addressed to Prof. J. B. S. Norton, 4922 40th Place, Hyattsville, Maryland, *enclosing self-addressed, stamped envelope, if reply is expected.*

For obvious reasons, there is a limit to the number of descriptions included from any one member in any one issue. Not more than five brief descriptions of clones under each generic heading will be published from any one member in any one issue of HERBERTIA. Descriptions of clones in excess of five brief descriptions, up to a total of 25, will be entered if the space required for each is limited to one line. In this case use should be made of the standard abbreviations already mentioned.

The AMERICAN PLANT LIFE SOCIETY numbers the clones known to be published, including those registered and not registered, in various publication media. It is thus an easy matter to report the approximate number of named clones as of any date. Such a report will be made as of July 1 in each year. On July 1, 1952, a total of 3996 hybrid *Hemerocallis* clones had been named.

HYBRID HEMEROCALLIS CLONES

Introduced by Stanley E. Saxton, Saratoga Springs, N. Y.

Far Hills. Robust plant with 45″ stems, well branched with up to 4 open flowers at once. Flowers medium large, full, recurved petsegs of Beetroot Purple (RHS) shading out to a border of Lilac Purple (RHS).

Throat is Javel Green in stunning contrast. The 'bluest' purple we have had. M. to ML. Dormant.

Harvest Sunshine. [Fig. 10] A large, broad petaled, late blooming self of sparkling sunshine yellow (light canary). Flowers open wide, somewhat reflexed, ruffled on petal edges and fragrant. Good branching near top of 36″ stem. Dormant. Medium late to late. Sdlg No. 50-93.

Satin Gown. Star shaped flower of clear, clean rose-pink. A self with no eyezone. Well open, petals somewhat ruffled. 32″, late midseason, dormant. Sdlg No. 50-87.

Introduced by Dr. J. B. S. Norton, Hyattsville, Maryland.

Arabian Sheik. A wide-petaled red, light scarlet, 25″ high, late midseason, day blooming, evergreen, flower 4—5 inches wide, full.

Vieux Carre. Latest of all, blooming Sept. 10 to Nov. 1. Long known and widely distributed in Louisiana, etc., but without name. A *H. fulva* clone, spreading by rhizomes; no seed set so far. Scape 24″ high, narrow segs, coral blush.

AMARYLLID GENERA AND SPECIES

Harold N. Moldenke

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to the readers.]

Pancratium mirennae G. E. Mattei, in Malpighia *31:* 148—149. 1928. Bulb very large, subglobose, tunicated, the tunics pale brown; leaves about 8, appearing after the flowers, either dry from the central bulb during anthesis or some others developing from the smaller lateral bulb, intensely glaucescent, narrowly linear, 7 mm. wide, almost flat, not at all contorted, not ciliolate, rather acute, mucronulate, much shorter than the scape; scape stout, lateral not central, leafless, compressed-terete (that is, obtusely 2-angled), about 12 inches tall; bracts of the spathe 2, free, lanceolate, broadly dilated below, long-acuminate above, scarious when withered, shorter than the flowers; bracteoles filiform, situated between the flowers; flowers umbellate, up to 7, large, showy, white, sweet-smelling, almost like those of *Funkia alba*, 16—17 cm. long; pedicels thick, to 10 mm. long; perogonium-tube stout, green on the outside, to 7 cm. long; segments of the perigonium very narrow, linear, not spatulate, the inner ones scarcely broader, acuminate-apiculate, erect-patulous, revolute along the margins on the outside, all merely pale

green-streaked on the back, grown together with the corona for a long distance and greatly surpassing the corona, 8—9 cm. long; corona large, ample, turbinate, the segments bifid between the stamens (that is, deeply 12-lobed), the lobes crisped-plicate, acute, denticulate toward the sinus, half as long as the stamens, to 5 cm. long; stamens decurrent into the corona; filaments long-surpassing the corona, incurved toward the throat, the free part 15 mm. long; anthers reniform, 6 mm. long; ovary oblong, obtusely trigonous, 15 mm. long; style longer than the stamens; stigma capitate-lobulate. The bulbs were collected on the island "Tine" Cycladum by Reverend Mirenna. Some species in this genus, confused under the name of *P. maritimum*, differ especially in the size of the leaves, the central or lateral scapes, the length of the floral-tube, etc. From Libiam around Machabez and Hennè, I have specimens which seem to belong to *P. aegyptiacum* Roemer.

Buphane longepedicellata Pax, Bot. Jahrb. *10:* 4. 1889. Bulb; leaves erect-divergent, glaucous, very glabrous, margined, the margin crisped; scape stout, almost equaling the leaves; spathe withered-deciduous during anthesis; bracts of the single flowers short, withered, filiform; inflorescence umbelliform, spherical, many-flowered; flowers regular, long-pedicellate; pedicels thick; tube of the perigonium very short, the segments narrow, recurved, rose, banded at the middle; stamens equal, inserted at the base of the perianth segments; filaments rose, erect-divergent, filiform; anthers affixed at the middle of the back, oblong, thick; ovary globose-trilobed during anthesis, 3-celled; style almost equaling the filaments, filiform; stigma shortly 3-lobed; ovules 2 or 3 per cell; capsule turbinate-trilobed, the cells 1- or 2-seeded. Leaves 1—1.5 cm. wide; scape almost 1.5 cm. thick, 12 cm. tall; inflorescence 20 cm or more in diameter; pedicels 10 cm. long in anthesis, 3 mm. thick; segments of the perigonium 4 cm. long, 3 mm. wide; filaments 4 cm. long; ovary 5 mm. long, 6 mm. in diameter. In sandy places at Barkly West, Griqualand West, South Africa.

Nothoscordum subsessile Beauverd, in Bull. Herb. Boiss. ser. II. *VIII:* 997, fig. 1-E-H. 1908. Bulb globose, 8—9 mm. in diameter, tunicated; leaves 1.5—4 cm. long, very narrowly linear, rather obtuse, flat; scape 6—8 cm. long, 1-flowered, glabrous, longer than the leaves; valves of the spathe 8—10 mm. long, ovate-lanceolate; pedicel almost none, 1—2 mm. long, much shorter than the spathe-valves; tepals 14—15 mm. long, rounded-spatulate, more or less connate at the base, equal, golden-yellow, green-uninerved; filaments 4—5 mm. long, flat, linear, gradually narrowed above, unequal; ovary 3 mm. long, 2 mm. wide, elliptic, its cells 8-ovulate; style 5 mm. long, longer than the ovary, coming between the anthers of the longer and shorter stamens; anthers 2.5 mm. long; stigmas ternate-capitate. Perennial. In wet places on the summit of Mt. Arequita, dept. Minas, Uruguay, April 18, 1908, C. Osten 5195 bis.

Pancratium hirtum A. Chevalier, Mem. Soc. Bot. Fr. lv. Mem. *VIII:* 88. 1908. Bulb ovoid, subspherical, 2—2.5 cm. in diameter, with an alliaceous odor, the external tunics rather grayish; leaves 3—5, linear, soft, canaliculate, 25—30 cm. long, 4—6 mm. wide, not twisted, pale

green, narrowed in the lower third into a canaliculate petiole which bears a few horrible hairs beneath; flowers solitary; peduncle short, 3—5 cm. long, slender, the portion above ground usually hirsute; spathe membranous, simple or bifid, 5—8 cm. long, terminating in one or two long, scarious, subulate acuminations; perianth-tube slender, 15 cm. long, cupuliform above, the segments lanceolate, ascending, 3—4 cm. long; corona of the stamens bicuspidate between each two stamens; anthers linear, yellow, 5 mm. long; fruit ovoid-triquetrous, 2 cm. long, crowned with the persistent base of the perianth-tube. Upper Chari—Eastern Chari: Kouti and the Ndouka country; at the foot of Kaga Batoro, on shaded ferruginous rocks, May 2—12, 1903, A. Chevalier 8381.

Nothoscordum felipponei Beauverd, in Bull. Soc. Bat. Genev. ser II. *13:* 267. 1921. Bulb ovate-elongate, about 2 cm. long and 1 cm. wide, with a white tunic and many scapes, with a neck elevated about 1 cm.; leaves completely glabrous, unequal, 3—8 cm. long, 1—2.5 mm. wide, recurved or patulous, white-scarious at the margin, dilated at the base, the limb narrowly lanceolate; scape glabrous, erect, exserted 1.5—3 cm. from the neck, reflexed after anthesis; valves of the spathe about 1.2 cm. long, white-scarious, 1-nerved in the middle, striate with 2—4 undivided nerves at the margin, the base of each one united into a short tube about 3 mm. long, bifid at the apex, the outermost one broader, the inner one narrower and with somewhat rolled back margins; flower shortly pedicellate, pedicel about 6 mm. long, erect, golden-yellow, tepals longitudinally one-nerved at the middle, the 3 outer tepals broader and longer than the 3 inner ones, about 1.9 cm. long and 7.5 mm. wide, attenuate at the base, obtuse and scarcely mucronulate at the apex; filaments yellow, inserted at the base of the tepals, about 6.5 mm. long, dilated at the base, subulate at the apex; anthers golden-yellow, about 2.25 mm. long; ovary obconic, about 3 mm. long; style exserted, about 4 mm. long; stigma capitate, obscurely trilobed; mature seeds unknown to me.—"*Triteleia sellowiana* Kunth?" according to Osten 3620 in Herb. Boissier: "perianth yellow, tepals shiny, separately dark purple-banded or -painted, connate at the base; leaves canaliculate, not carinate on the back".—In rocky places, Cerro, dept. Montevideo, Uruguay, July 31, 1898, collected by Cornelius Osten, not *Nothoscordum sellowianum* Kunth, Enum. Plant. 4: 457 et seq. (1843) !—"Cuchilla de Pereira, Montevideo", in the month of June, 1920, where it was collected by the distinguished Dr. F. Felippone (his number 3493), to whom this remarkable *Nothoscordum* is dedicated.

Nothoscordum ostensii Beauverd, in Bull. Herb. Boiss. ser. II. *8:* 996, fig. 1-J-M. 1908. Bulb subconic, 10—12 mm. in diameter, brown-tunicated; leaves 8—12 cm. long, very narrowly linear, rather thick, canaliculate, flexuous; scape 4—8 cm. long, 1-flowered, glabrous, subequaling or surpassed by the leaves; valves of the spathe 9—12 mm. long, ovate-lanceolate, acuminate; pedicel 6—10 mm. long, shorter than or subequaling the spathe-valves; tepals 10—14 mm. long, oblong-spatulate, obtuse or rather acute, almost free at the base, equal, golden-yellow, brown-uninerved; filaments 6—7 mm. long, flat, lanceolate-subulate; ovary subclavate, 3 mm. long during anthesis, the cells 8—12-ovulate;

style 6—7 mm. long, twice as long as the ovary; anthers 1.75—2 mm. long, shorter than the style; stigma capitate. Perennial. On stony hills. Molles. Est. Lawlor, dept. Payandú, Uruguay, August 29, 1898, C. Osten 3611.

Nothoscordum canescens Beauverd, in Bull. Herb. Boiss. ser. II. *8:* 998, Fig. 1-A-D. 1908. Bulb globose, 9—10 mm. in diameter, brown-tunicated; leaves 6—10 cm. long, very narrowly linear, rigid, rather obtuse, flat; scape 6 cm. long, 1-flowered, hirtellous, shorter than the leaves; valves of the spathe 10—12 mm. long, elliptic-acuminate; pedicel almost absent, 1 mm. long, greatly surpassed by the spathe-valves; tepals 11—12 mm. long, elliptic, rather acute at the apex, lightly recurved, almost free at the base, golden-yellow, green-uninerved; filaments 7—8 mm. long, subulate, dilated-flat below, the alternate ones longer; ovary 3 mm. long, obovate, the cells 8-ovulate; style 4 mm. long, slightly longer than the ovary, with its apex coming to below the anthers; anthers 4 mm. long; stigmas capitate. Perennial. Smelling greatly of *Allium!* In wet places on the summit of Mt. Arequita, dept. Minas, Uruguay, April 18, 1908, C. Osten 5195.

Nerine gaberonensis C. E. B. Bremekamp & A. A. Obermyer, Ann. Transvaal Mus. *16:* 409. 1935. Bulb globose, 1.5—2 cm. in diameter, protracted into a long, spongy, cylindric neck 2.5—3 cm. long; leaves protruding 0.2—10 cm. from the neck, filiform, 1 mm. wide, glabrous; peduncle about 15 cm. long, terete, glabrous; inflorescence in the form of a centripetal umbel; flowers 14 or 15; valves spathaceous, triangular, acute, 1.5 cm. long, 3 mm. wide; pedicel terete, glabrous, 1-5—2.5 cm. long; perianth wine-red, 2 cm. long, the tube 3 mm. long, the segments linear or linear-oblanceolate, 3-nerved, undulate, obtuse, 1.7 cm. long, 2 mm. wide; filaments inserted in the throat of the tube, shortly connate at the base, in 2 series, the longer 17 mm. long, the shorter 14 mm. long; anthers 3 mm. long, oblong, emarginate at apex and base, dorsifixed; ovary 2 mm. in diameter, globose, glabrous, the cells containing a single ovule; style 2.2 cm. long, filiform; stigma obscurely trienspidate; capsule deeply 3-lobed, membranous. Bechuanaland.

Gethyllis herrei L. Bolus, Jour. Bot. *71:* 122. 1933. Bulb 4.5 cm. long, 3.5 cm. in diameter; basal sheaths 2, marked with deep purple spots and lines, widened above into a hollow with involute margins; leaves 20—30, distantly spirally twisted, narrowly linear, glabrous, exserted to 8 cm. above the upper sheath, 2—3 mm. wide; perianth-tube of withered flower persistent on the fruit and 7 cm. long, in a normal flower 4 mm. in diameter; segments obtuse and apiculate or abruptly acute, white, 3 cm. long, the outer ones 1.2 cm. wide, the inner ones 1 cm. wide; stamens numerous; filaments very short; dried anthers to 1.6 cm. long; style exserted to 7 mm.; stigma small; fruit clavate, yellow, with two blood-red bands, 8 cm. long when dry, 2.1 cm. wide when flattened out, with a disagreeable odor. Namaqualand.

Hessea karooica Barker, Jour. S. Afr. Bot. 1: 32, pl. 1, fig. A. 1935. Bulb oblong-globose, 2 cm. in diameter, 2.5 cm. long, protracted into a neck 2.4 cm. long; leaves 2, appearing after the flowers, obovate, obtuse,

attenuate at the base into a short petiole, minutely scabrous along the margins; peduncle flexuous, reddish at the base, 9—10 cm. long; umbel 6—13-flowered; flowers white and rosy, 1.1 cm. in diameter; spathe 2-foliate, the valves lanceolate, acuminate, papery, purplish, to 2.5 cm. long; pedicels ascending, finally spreading, 4.2 cm. long; perigonium deeply 6-parted, the segments obovate, subacute, attenuate at the base, very wide-spreading, white on the inner surface and rosy-lined, abundantly rosy-lined on the outer surface; filaments subulate, broad at the base, subequal, erect, shorter than the segments; anthers small; style white, expanded at the base, subulate above; ovary purplish, 1.5 mm. in diameter. Cape Province.

Hessa unguiculata Barker, Jour. S. Afr. Bot. *1:* 33, pl. 1, fig. B. 1935. Bulb 3 cm. in diameter, protracted into an elongated neck, to 5 cm. long; leaves 2 or 3, erect, bright green, shiny or glaucescent, obtuse or acute, to 10 cm. long, to 3 cm. wide, mostly broader at the middle, somewhat narrowed at both ends, sometimes broader at the apex, with undulate margins, minutely ciliate, convex above, the upper surface, base, and apex minutely ciliate, one leaf straddling the other; peduncle flexuous, 30 cm. long, 3 mm. in diameter; umbel to 17-flowered; flowers white; spathe 2-foliate, the valves oblong-lanceolate, purplish, 2.5—3 cm. long; pedicles ascending, 3.5—6.5 cm. long; perigonium deeply 6-parted, the outer segments acute, the inner ones obtuse, very wide spreading, white on the inner face, red-lined on the outer face, 10 mm. long, 5 mm. wide, all unguiculate at the base; filaments subulate, equal, shorter than the segments, 8 mm. long; style white, expanded at the base, subulate above; ovary 1.5 mm. in diameter. Cape Province.

Gethyllis lata L. Bolus, S. Afr. Gard. *22:* 83, 88. 1932. Only withered leaves seen, linear, 5 mm. wide; perianth-tube 2.3 cm. long above the surface of the ground, the segments 2.2 cm. long, the outer ones to 1.8 cm. wide, obovate-orbicular, white, suffused with rose, with a small apical gland, the inner ones to 1.5 cm. wide, broadly elliptic; stamens 6; filaments exserted 6 mm., slender; anthers about 4 mm. long, not spirally twisted; style exserted 1.1 cm., eccentric, spreading-erect; stigma concave at the middle, 1.5 mm. in diameter. Nieuwoudtville, in the region of Calvinia, Buhr (S. U. G. 727a), in flower November 23, 1931.

Nerine schlechter Baker, in Bull. Herb. Boiss. 2nd ser. *3:* 665. 1903. Bulb unknown; leaves unknown, but probably appearing after the flowers; scape 12 or more inches tall, slender; umbels 3—5-flowered, the valves of the spathe 2, lanceolate, scarious, 12—18 mm. long; pedicels 6—8 mm. long, densely pubescent; ovary depressed-globose, 4 mm. in diameter, densely pubescent; perianth white, 12—14 mm. long; tube above the ovary none; segments flat, equal, lanceolate, 4 mm. wide; stamens declinate, equaling the perianth; filaments filiform, without appendages; anthers small, oblong, brown. Among rocks on Mt. West, alt. 1800 m., Natal, southeastern Africa.

Gethyllis multifolia L. Bolus, Jour. Bot. *67:* 135. 1929. Bulb apparently 4.5 cm. in diameter when dried; basal sheath subtruncate, 4.5 cm. long; leaves 25—30 in a fascicle, narrowly linear (when fresh per-

haps subterete), distantly spirally twisted above, pubescent, 15 cm. long above the surface of the ground, 1 mm. wide, with sparse setae which are pale brown; perianth pale rose, glabrous, the tube exserted 2.5 cm. above the surface of the ground, the segments oblong-lanceolate, acute, slightly narrowed below, 3 cm. long, to 1 cm. wide; stamens 12, monantherous filaments 4 mm. long; anthers 7 mm. long; style strict, exserted 1.6 cm. beyond the perianth-tube, reaching to the middle of the anthers; stigma 1 mm. in diameter. Cape Province.

Gethyllis unilateralis L. Bolus, Jour. Bot. *67:* 135—136. 1929. Bulb not seen; leaves only seen in the withered state, in fascicles of 20, narrowly linear or subterete, slightly spirally twisted, inconspicuously ciliate, to 12 cm. long, 1 mm. wide; perianth rose or pale rose, the tube exserted to 11.5 cm. or more above the surface of the ground, 3 mm. in diameter, the segments acute or abruptly acute to 3.5 cm. (more often 2—3 cm.) long, 1—1.8 cm. wide; stamens 6, monantherous; filaments slender, 3—5 mm. long; anthers finally conspicuously circinate-revolute; style unilateral, considerably surpassing the filaments; stigma in age 1 mm. or more in diameter. Cape Province.

Gethyllis linearis L. Bolus, Jour. Bot. *67:* 136. 1929. Bulb about 1.5 cm. in diameter; leaves 8—10 in a fascicle, linear, flat, closely spirally twisted from a little above the base, glabrous, subglaucous, about 6 cm. long, 2—3.5 mm. wide; perianth rose, its tube 8 cm. long or longer, the segments oblong-obvate, rather abruptly acute, 3—5.5 cm. long, to 1.4 cm. wide; stamens 6, monantherous; filaments and anthers equally long, 4—5 mm. long; style unilateral, exserted 1.6 cm. beyond the perianth-tube; stigma finally 1.5 mm. in diameter. Cape Province.

Gethyllis grandiflora L. Bolus, Jour. Bot. *67:* 136. 1929. Bulb 5.5 cm. in diameter; tunics membranaceous, very thin, conspicuously transversely nerved, without color; leaves mostly withered during anthesis, but nevertheless apparently 45 in the one fascicle seen contemporaneously with the flower, almost all herbaceous, narrowly linear, glabrous, spirally twisted above, 14 cm. long above the surface of the ground, 2—3 mm. wide; perianth glabrous, white, more or less suffused with rose, the tube 6 mm. long, 4—5 mm. in diameter at the base, 9 mm. in diameter at the apex, shortly funnel-form, the segments acuminate, the inner ones always broader than the outer ones, ovate, to 3.5 cm. wide, 5—6.5 cm. long; stamens 6, 8—11-antherous, the anthers shortly stipitate or with a stipe to 5 mm. long, 1.2 cm. long, greatly surpassing the filaments; style strict, exserted about 8 mm. beyond the tube; stigma small. Little Namaqualand.

Gethyllis longituba L. Bolus, Jour. Bot. *67:* 136—137, 1929. Bulbs 2.5 cm. in diameter, 2 or 3 arising from a thickened stem 6 cm. in diameter; sheath purple-spotted above, to 4 cm. long, 1 cm. in diameter; leaves in fascicles up to 18, narrowly linear, spirally 1-twisted, glaucous-green, glabrous and polished, except for the ciliate margins (the cilia spreading or ascending, slightly rigid, white), 13 cm. long above the surface of the ground, 3—6 mm. wide; spathe 7.3 cm. long, sheathing for 3 mm.; peduncle 3 cm. long; perianth glabrous, the tube to 17 cm.

long, the apex 1 cm. in diameter, the segments linear-lanceolate, gradually attenuate above, pale on the inner face, deep rose on the outer face, to 5.5 cm. long, the inner ones to 1.2 cm. wide, the outer ones slightly narrower; stamens to 36, monantherous; filaments 2—3 mm. long; anthers finally conspicuously circinate-recurved, 1.3 cm. long; style strict, exserted 1 cm. beyond the tube; stigma small; fruit oblong-oval, 4 cm. long, 1.7 cm. in diameter; seeds obovate, to 5 mm. long. Cape Province.

Nothoscordum sellowianum Kunth, Enum. Pl. *4:* 460. 1843. Leaves narrowly linear, subequaling the scape; umbel 5- or 6-flowered; spathevalves ovate, acuminate; sepals oblong-lanceolate, rather obtuse, equal, connate at the base; filaments flat, subulate; ovary subcordate-globose, the cells 5-ovulate; style twice as long as the ovary or longer. Collected at Montevideo. A perennial plant; the bulb subglobose, tunicate, whitish; scape 8 to 9 inches long, leafy at the base; leaves narrowly linear, rather obtuse, glabrous, subequaling the scape, 2 mm. wide; umbel 5- or 6-flowered; pedicels 12 to 30 mm. long; spathe 2-valved, a third as long as the pedicels, hyaline-membranous, the valves ovate, acuminate, connate at the base; flowers the size of those of *N. striatum,* erect; sepals oblong-lanceolate, rather obtuse, 1-nerved, equal (?), connate at the base, whitish (?); filaments flat, similar, less than half as long as the sepals; ovary subobcordate-globose, the cells 5-ovulate; style about twice as long as the ovary; stigma subcapitellate, entire. Distinct from *N. striatellum* in the form of the ovary. Is it the same as *N. striatum* or *N. euosmum?*

Milla vitata Griseb., in Goett. Abh. *24:* 318. 1879. Bulb subglobose; scape a hand's breadth [15 cm.?] long, 1-flowered; pedicels not articulated at the apex, surpassing the bracts which are connate at the base; leaves flat, narrowly linear, rather erect, slightly exceeding the scape; perigonium 6-parted, the segments white, red-keeled, oblong, rather acute, four times as long as the funnel-form tube; stamens in two series. It is related to *M. sellowiana,* but is white-flowered and the perigonium is more deeply divided. Leaves 4 to 6, 10—15.3 cm. long, 1.6 mm. wide; scape, including sheath, ½ to 1 inch long; bracts lanceolate-linear 1—1.3 cm. long; pedicels 1.3—2.5 cm long; perigonium 1—1.3 cm. long (its tube almost 2.4 mm. long; cells of the ovary about 8-ovulate. Collected near Conception del Uruguay, everywhere in field after the first rains at the beginning of May.

Milla tweedieana Griseb., in Goett. Abh. *24:* 319. 1879. Differs from the preceding in having the leaves recurved and the scape dwarf 2.5—5 cm. long, sheathed up to the middle and producing a whorl of leaves at the middle; perigonium white, the tube obconic, almost twice as long as the funnel-form limb; stamens in two series, three longer than the others; anthers oblong, incumbent, entire at the apex; stigma capitate, penicillate-hairy; cells of the ovary 10-ovulate. Collected near Conception del Uruguay, in grassy places, blooming around the end of June. ("Buenos Aires").

Milla poeppigiana Baker, Jour. Linn. Soc. Bot. *11:* 383. 1871. Bulb not seen; leaves 6 to 8, synanthous, fleshy-herbaceous, almost flat, 20—

30 cm. long, 5 to 6 mm. wide; scapes 2 or 3, flaccid, almost equaling the leaves; spathe-valves 2 (rarely 3 or 4), lanceolate, 2.5 cm. long, connate at the base; umbels 4- to 8-flowered; pedicels scarcely articulated at the apex, 2.4—3 cm. long; perianth funnel-form, pale-lilac, 18 to 20 mm. long, the segments oblong-spatulate, very slightly longer than the funnel-form tube which is 4 mm. wide at the mouth; stamens in two series in the tube; filaments filiform, 4 mm. long, the upper ones reaching to the throat; ovary sessile; style filiform, 4 mm. long. Collected in Chile by C. Gay.

Milla bivalvis Baker, Jour. Linn. Soc. Bot. *11:* 286. 1871. Bulb ovoid, 12 to 18 mm. thick, membranous-tunicate; leaves 4 to 6, synanthous, fleshy-herbaceous, 6 to 9 inches long, 2 to 4 mm. wide; scape soft, subequaling the leaves; spathe-valves 2, linear-lanceolate, connate at the base, 12 to 18 mm. long; umbels 2- to 4-flowered; pedicels flaccid, 12 to 24 mm. long; perianth funnel-form, white or white-violet, 12 to 14 mm. long, the segments oblong-spatulate, distinctly brown-kneeled, 4 times as long as the bell-shaped tube; stamens in two series in the tube; filaments flattened downwards, 3 mm. long; ovary sessile; style filiform, 2 to 3 mm. long; seeds 5 or 6 in each cell. Collected in Chile by Beechey, by Bridges, Cuming 651, etc.

Zephyranthes minuta (HBK)M. Roem., Syn. Ensat. 121. 1847. Flowers pedunculate, solitary; spathe monophyllous, shorter (only half as long as the flowers), tubular, bifid, acuminate, equaling the campanulate limb of the perigonium; genitals erect; leaves very narrow, linear, flat, striate, somewhat shorter than the scape; spathe inflated at the base; bulb oval, of the size of a small cherry, furnished with small rootlets at the base. Leaves obtuse, glabrous; scape terete, glabrous, an inch long; spathe striate, very thinly membranous, whitish, half as long as the flower; flower an inch long, erect, white or rose-colored, the tube cylindric; ovary triquetrous; stigma trifid. Found in wet temperate places in Mexico between Real del Monte and Cerro Ventoso, alt. 8580 ft. Flowers in June.

Nothoscordum montevidense (montevidensis sphalm) Beauverd, Bull. Herb. Boiss. ser. II. *6:* 1011. 1906. Bulb globose, 10 to 12 mm. in diameter, cinereous; scapes 1 or 2, 2-flowered, 5 to 8 cm. tall, many-leaved at the base; leaves surpassing the scape, narrowly linear, mucronulate, flat, smooth, 0.5 to 0.75 mm. wide; pedicels filiform, 6 to 28 mm. long; spathe 2-valved, the valves hyaline-membranous, 7 to 11 mm. long, connate at the base; sepals yellow, 1-nerved, 8 to 10 mm. long, connate at the base; filaments flat, lanceolate-subulate, yellow, three-quarters the length of the sepals; anthers oblong-linear, tufted; ovary subglobose; style twice as long as the ovary; stigma obtuse.—It blooms in March. It grows in field at Montevideo *(Osten 3717).*

Milla andicola Baker, Jour. Linn. Soc. Bot. *11:* 381. 1871. Bulb 1 inch thick, brown-tunicate, the outermost membrane long-protracted around the base of the scape and leaves; leaves 5 or 6, fleshy-herbaceous, lasting quite long, surpassing the scapes, 1 mm. wide; scapes firm, 3

to 6 inches long; spathe-valves 2, opposite, lanceolate, connate at the base, 12 to 16 mm. long; umbels 6- to 10-flowered; pedicels 6 to 12 mm. long, the apex scarcely articulated; perianth 10 to 12 mm. long, pale-lilac, lanceolate-spatulate, erect-spreading, twice as long as the tube, whose mouth is 2 to 2½ mm. wide; stamens in one series from the throat of the tube, the filaments 4 mm. long, flattened downwards; ovary sessile, the cells 6- to 8-ovulate; style 4 mm. long. Found in the Peruvian and Bolivian Andes along the shores of Lake Titicaca, collected by Meyen and by Pentland.

Allium macrantherum O. Ktze., Rev. Gen. *3:* 312-313. 1898. Anthers linear-oblong, half the length of the filaments or longer; plant small, 10 cm. tall; leaves subfiliform; umbel 4- to 6-flowered; tepals 5 mm. long, white. Collected at Villa Florida, Paraguay.

Nothoscordum gaudichaudianum Kunth, Enum. Pl. *4:* 458. 1843. Leaves very narrowly linear, shorter than the scape; umbel 3- to 5-flowered; spathe-valves ovate-oblong, acuminate; sepals oblong, obtuse, connate at the base, subequal; filaments subulate, the alternate ones longer; ovary oblong, the cells 11-ovulate; style 1½ times the length of the ovary. Collected by Gaudichaud at Montevideo. A perennial plant with the bulb subglobose, tunicate, about the size of a small hazelnut, the tunics dry-membranous, whitish; scapes 2 or 3 per bulb, 2 to 4½ inches tall, surpassing the leaves; leaves very narrowly linear, obtuse, glabrous, 0.5—0.7 mm. wide; umbel 3- to 5-flowered; pedicels 10 to 16 mm. long in flower, 20 mm. long in fruit; spathe 2-valved, hyaline-membranous, half as long as the pedicels, the valves ovate-oblong, acuminate, connate at the base; flower of the size of those of *N. striatellum,* whitish, the nerves dark-violet; sepals oblong, obtuse, 1-nerved, connate at the base, subequal; stamens inserted at the base of the sepals and shorter than they; filaments subulate, the alternate ones longer; anthers oblong, tufted, yellow, bilobed at the base; ovary sessile, oblong, 3-celled; ovules 11 in each cell, in 2 series; style 1½ times as long as the ovary; stigma depressed-rotund, entire; style small, broader; capsule subglobose, similar to that of *N. striatellum,* differing chiefly in the 11-ovulate ovary-cells. The general appearance is that of *Allium moschatum.*

Caloscordum exsertum Lindl., Bot. Reg. Lond. *33:* sub pl. 5. 1847. Leaves very narrow, flat, half as long as the scape; umbel few-flowered, contracted; pedicels hardly twice as long as the perianth; stamens exserted, shorter than the filiform style.

Milla violacea Baker, Jour. Bot. Lond. *12:* 5. 1874. Leaves 5 or 6, narrowly linear, glabrous, fleshy-herbaceous, 1 to 1½ feet long, 3 to 4 mm. wide; scape weak, subequaling the leaves; spathe-valves 2, lanceolate, 24 to 30 mm. long, connate downwards; umbels 4- to 6-flowered; pedicels 18 to 24 mm. long; perianth violet, funnelform, the segments oblong-lanceolate, 6 mm. wide, 3 or 4 times as long as the campanulate tube; stamens in 2 series in the tube; filaments linear, 6 mm. long; style

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 28.]

THE LECTOTYPES OF **AMARYLLIS BELLADONNA** L., AND **AMARYLLIS ROSEA** LAMARCK

HAMILTON P. TRAUB

Traub & Moldenke (1949, pp. 33-53) have designated the lectotype of *Amaryllis belladonna* L. (1753), and they (Traub & Moldenke, 1949, pp. 26-33) have also laid the foundation for determining the lectotype of *Amaryllis rosea* Lamarck (1753). The purpose of the present paper is to bring the typification of these two species up-to-date on the basis of the International Code (Lanjouw et al, 1952).

I. The lectotype of *Amaryllis belladonna* L. (1753)

According to Art. 21 (Note 2) of the International Code, in the case of a species without a type specimen, the type may be a description or figure to which the name is permanently attached. Linnaeus (1753) did not indicate a type specimen (holotype) for the name, *Amaryllis belladonna* L., and Traub & Moldenke (1949) therefore designated the illustration by Herman (1698, plate 194, "Lilium belladonna") as the type illustration (lectotype). This happens to be the very first illustration of this species, cited through Hortus Cliffortianus, 1737, page 35, by Linnaeus under *Amaryllis belladonna* L. (1753). It would have been equally valid if the choice had been made from other material considered by Linnaeus (1753) when he proposed the species. This material includes the illustrations by Merian (1705, plate 22) and Seba (1734, plate 17, fig. 1); and the detailed descriptions of the species by Herman (1698, p. 194) and Sloane (1707, 1: p. 244). However, the illustration by Hermann (1698, plate 194, "Lilium belladonna") is the first one published of this species, accompanies the first detailed description of this species, and is the first one associated with the species epithet, "*belladonna*," and is thus without question the most appropriate choice, and this selection is confirmed in the present paper.

II. The lectotype of *Amaryllis rosea* Lamarck (1783)

Lamarck (1783) gave the first validly published name to the Cape Belladonna, *Amaryllis rosea* Lamarck. As pointed out by Traub & Moldenke (1949), Lamarck realized that this species had been omitted from Species Plantarum, 1753, and he proposed this species on the basis of an adequate description that leaves no doubt as to its identity. He also cited references to the Cape Belladonna in the pre-Linnean literature. In Lamarck's day the habitat of this species was not generally known. Although Hermann (1687) had correctly indicated its habitat, Lamarck in common with some other workers erroneously indicated it as "middle America on the Antilles and at Cayenne." Since the description is adequate, and the literature citations are correct, the error about

the habitat is of no consequence. On the species level therefore the epithet, "*rosea*" must be maintained for the Cape Belladonna irrespective of the genus to which it may be later referred unless the name is already occupied in such a genus.

Lamarck (1783) does not cite an herbarium specimen as the type (holotype), and actually says that he has seen a living specimen which apparently means that he did not have an herbarium specimen at the time. In contrast, he says under the following entry in the text that he has seen a dried specimen of this other species. In the absence of a holotype, it is in order to select a substitute type (lectotype) for the name, *Amaryllis rosea* Lamarck (1783) from the material actually studied by Lamarck (1783) at the time that the species was proposed. He refers to Ferrari (1633, p. 117, plate 121) through Morison (1680, p. 367, fig. 32) and Tournefort (1700, p. 385), and to Barrelier (1714, p. 70, plate 1040). Lamarck (1783) also cited Miller (1760, "Dict. ic. t. 24") which refers to the actual number on the plate as published. However, a mistake was made by the printer, and the plate should actually have been numbered "23." This excellent plate (Miller, 1760, plate 23, err. no. 24) is designated as the lectotype of *Amaryllis rosea* Lamarck (1783).

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3. GENETICS AND BREEDING

THIRTY YEARS WITH DAFFODILS

EDWIN C. POWELL, *Maryland*

My first introduction to daffodils was in 1921 when we moved from Massachusetts to Maryland. There was growing on the place that we rented a half dozen varieties including EMPEROR, EMPRESS, BARRII CONSPICUUS, VON SION, and two small Leedsiis. In 1925, just before the quarantine on *Narcissus* and other plants was made effective by the Federal Horticultural Board, I imported from Holland 5 or 10 bulbs each of 47 popular varieties including 8 species. The only ones remaining here are EMPRESS, MAXIMUS, SIR WATKIN, WILL SCARLET, BEATRICE, ELVIRA, BARRII CONSPICUUS, *N. bulbocodium conspicuus*, *N. cyclamineus major*, *N. triandrus albus*, *N. jonquilla*, and *N. odorus rugulosus*, all of which have been growing in the grass for many years. The others have been superseded by better varieties and few, if any, are now grown commercially.

The late Dr. David Griffiths suggested that I do some crossing and produce varieties better adapted to American conditions than many of those then grown. I got some experience in hybridizing in 1926 but no daffodils that were better than their parents. From KING EDWARD x BERNARDINO in 1927 and from ALBATROSS x MRS. ROBERT SYDENHAM I obtained two very good flowers with some red or pink in the crowns.

I imported each year under special permit for breeding a half dozen or more of the best new varieties that I could afford to buy. This new blood began to tell and, as I made many crosses each year, I obtained a few very good things. Until I quit hybridizing in 1947 I had made several thousand crosses, produced more than 60,000 seedlings of which 60 were named and introduced.

The most valuable parent by a long ways was FORTUNE and some of its progeny but it never produced anything worth while as a seed parent although other breeders have obtained some fine things from it; as a pollen parent it was unsurpassed. Bred to BERNARDINO it gave me FORBER, POCAHONTAS, NANSEMOND, and several other good ones that were not named. BOKHARA, a son of FORTUNE, on BERNARDINO produced BASHIBISH, and on SUNSTAR, CATSKILL, possibly the most stunning bicolor medium trumpet that I have produced. Other outstanding progeny of FORTUNE were the bicolors ANOKA from SERAGLIO, IROQUOIS from PROSPERITY, KATHADIN and ONTARIO from ROBIN HOOD, and the big white trumpet NASHUA from KENBANE. NEVIS x NAXOS produced the early

white trumpet AGAWAM and NEVIS x GODOLPHIN the reversed bicolor trumpet ITASCA.

At one time I used *N. jonquilla* and *N. triandrus albus*, as pollen parents and from the latter obtained many attractive hybrids that were useful for decorative purposes. Unlike the experience of many English breeders they proved to be hardy and long lived. From BEACON x. *N. triandrus calathinus* I obtained HAVILAH, a tall white flower with many on a stem and very prolific. TREVISKY x JONQUILLA gave a red-eyed hybrid of good form and substance.

It is difficult to name favorites in a big family of fine children but a few unusual crosses have given progeny in which I take much pride. One is CHICOPEE, a first-early from *N. obvallaris* x. *N. cyclamineus*, a small flower but unlike anything that I have seen. Another is HIAWASSEE, a hardy tazetta from CASSANDRA x PAPER WHITE. About the latest to bloom in its class is NAKOTA from PHYLLIDA x GAZA, a fine large white medium trumpet. The older varieties PILGRIMAGE and WHITE EMPEROR as seed or pollen parents produced some progeny of very good form, clear color, and excellent substance.

When I began to use my seedlings as one or both parents the pedigrees became too lengthy and involved to record here but I obtained some of the finest things that I have produced. I made my last crosses in 1947 and am looking forward to see what many of the flowers will be when they bloom next spring. Some should be pretty good if good parents are responsible for good children, a proposition that has been borne out about 100 percent in my experience.

NARCISSUS BREEDING REPORT

W. R. BALLARD, *Maryland*

During the 1952 blooming season in my garden there were probably in the neighborhood of 800 seedlings in bloom. In general the best of these flowered in the early part of the period. It has been noted that in the last two years most of the more promising seedlings were past their prime at the time of the National Capital Narcissus Shows. However, in the spring of 1951 two seedlings entered in the Show scored 82 and 85 respectively. These were ALCIDA x MRS. BACKHOUSE and a BICOLOR x BEERSHEBA crosses.

One of the difficulties so far experienced is to find time to evaluate the seedlings, to make selections of the best and to describe them accurately. The task of making new crosses and keeping records is demanding. It would be easier if attention could be devoted exclusively

to the narcissus project, but always there is the pressure of other garden work to interfere.

When the next blooming period arrives it is planned to remove the more promising seedlings and to plant them together in a bed where they can more readily be compared. There will still remain the problem of deciding how to dispose of those left behind. Many, of course, are worthless and they will be destroyed. However, a considerable proportion have merit and, while not good enough to name and introduce, could furnish good cutting material or be used in landscape plantings. Some of them could possibly be turned over to public institutions such as parks.

Until a more careful study can be made of the seedlings it is not possible to report in much detail the results to date. Most of the more exciting forms have been bicolors or whites of various sorts. There are both short cups and long trumpet forms. Seedlings of John Evelyn seem to give a fairly high percentage of fringed cups. So far no pink seedlings have appeared but this is not surprising since most of the direct pink crosses are yet to bloom. One interesting seedling, a Whiteley Gem x Roxane cross has a broad symmetrical white perianth with a wide, rather flat, cup of buff. A few good yellow trumpets with excellent finish have appeared from Jonquil crosses.

Many of the seedlings have shown sufficiently good qualities to warrant their use in other crosses and several have been combined with named varieties as well as with each other. In addition to these selected seedlings a number of new named varieties have been added to my collection and these will be used in future crosses. Breeding of this sort is a continuing process and the accumulated stock becomes of increasing value with the passing of the years. With so many types to work with the possibilities seem endless. For this reason one worker can have only a very small part in the development of the narcissus of the future.

BREEDING NARCISSUS FOR VARIOUS CLIMATIC REGIONS

J. S. Cooley, *Maryland*

The wild species of *Narcissus* occur in relatively restricted regions in Europe, Asia and Africa. The horticultural varieties of *Narcissus* however, are grown in many places over the world. This involves a wide range of climate and soil. Many of the varieties now available may be very satisfactory when grown under optimum conditions, but when grown in conditions that prevail in certain places may be very unsatisfactory.

A very encouraging thing for the daffodil fancier who may be located in some region where sub-optimal conditions prevail is the fact that *Narcissus* breeders are now located in many places over the world. These breeders are therefore breeding and selecting the progeny where diverse climatic conditions prevail.

Each of these breeders is selecting seedlings that show promise when growing in his particular locality with its climatic peculiarities. However, seedlings that might be meritorious in some other environment are discarded. Furthermore each breeder has his own particular objective in choosing his parents and in selecting the progeny. The ultimate outcome of all these divergent efforts will undoubtedly greatly enlarge the scope of this flower and also enhance its utility and appreciation.

The breeding of *Narcissus* has its tedious time consuming and laborious aspects as well as the long waits for results. It has also its thrills in watching a bed of seedling bloom for the first time—always with the hope and expectation that may be this bed will produce a highly superior flower.

Considering how satisfactory *Narcissus* are as garden plants and also as cut flowers, it seems strange that it is not more extensively used and appreciated by gardeners. No doubt the patient efforts of the many breeders located at various places over the world will help to increase the use and enhance the appreciation of this beautiful spring and autumn flower.

ADVENTURES IN BREEDING HEMEROCALLIS

Stanley E. Saxton, *New York*

The writings of most hemerocallis breeders show a fairly consistent developmental pattern. The breeder, after deciding upon certain objectives which he deems desirable, selects parent clones which exhibit the characteristics wanted to some degree, and crosses them. From the progeny he selects individuals that show advance in the desired characteristics and continues selective breeding between the offspring, or crosses them back on the parent stock to accentuate certain traits. This inter-breeding of the line continues until either (a) the desired plant is achieved, or (b) the line 'runs out'. Experience shows that continuous stress on a few features tends to weaken the strain, and sometimes it is not possible to continue such line breeding to success.

Whether it be with plants, animals or humans there seems to be a 'high point' in line breeding. How many times has history shown that genius of a certain type rarely begets similar genius in its offspring. J. S. Bach came from a long line of musicians and several of his children followed music as a profession; but none, either before or after Johann Sebastian, attained his high degree of musical skill. One could mention dozens of similar situations in the world of growing things.

It seems to me that too many daylily breeders have failed to realize this weakness in line breeding, and have continued with their favorites long after the best had been passed. Too many times have I visited seedling plots which seem ever to repeat those favorite characteristics in

Fig. 10. Hybrid Daylily—*Harvest Sunshine* (Saxton). A large light yellow self which blooms late—August in New York. It is well-branched, fragrant, with wide ruffled tepalsegs; about 3 ft. tall. Deciduous.

which a breeder has specialized for many years. What is the answer for him who would avoid this pitfall?

Luckily for the new daylily breeder, the 'high points' of other breeders' efforts are still available; and if the newcomer is observant he will know which of his own developments represent peaks in his own breeding program. He can, it seems to me, improve the quality of his seedlings, introduce new possibilities, and extend the best of his own

developments by judicious use of the best of his own in combination with the best of others.

It is not enough, however, to select a good clone from each of several breeders and hope to accomplish much by combining them. Possibly a hundred amateurs are doing the same thing. It is first essential to develop something special by selective breeding which is not available to anyone but yourself. Then combine this with the best from other sources. This has been my program and I think it is beginning to show results.

My first effort was to produce clearer colors by breeding out the ever present yellow base color in the hemerocallis. It is this yellow background which turns our reds into orange, our pinks into salmon and our purples into garnet or brown. In my first cross, many years ago, I used the lightest Betscher variety obtainable, and crossed it on a Stout variety with a very light yellow background. Luckily for me the Stout flower had some rose pigment in its makeup and this has proven dominant so that as the strain has developed I have obtained pinks with purer and purer color as the yellow was bred lighter. Once in a while, perhaps in 5% of the progeny, the rose is lacking and a clear light yellow or cream flower emerges. EVALINA was one of three such individuals in the last group of about a hundred seedlings out of this line. It is almost white excepting for the delicate red halo at the throat which I believe comes from ROSALIND introduced into this program a few generations back. All the rest were shades of pink, rose or rose-red with some bicolors, but all much clearer than previous progenies.

SATIN GOWN is the best of the clear selfs without eyezone; FIRST PROM is the cleanest pink and yellow bicolor; PINKIE the most dwarf; and EVALINA seems the best very light ivory self.

There has been no attempt to interbreed these further as it is doubtful if the gains would be worth the effort. From now on these pinks will be bred with the best pinks from other sources. This has already been done to some extent with such clones as MAID MARIAN, MARTHA WASHINGTON, PINK DREAM, PINK ANGEL and others. Improvement in some features has already appeared. The best of the 1952 pinks was a seedling involving MAID MARIAN. It is a lighter shade than MAID MARIAN and more pink but with good size and wide ruffled petals. According to the RHS color chart the predominant shade is "Shell Pink" No. 516. This clone has been named TAFFETA: [Medium size, compact, wide petaled flower with recurved segments. The petals are very broad at the center and somewhat pinched at the ends. Color is Shell Pink (RHS-516). Stems 38", Dormant. Midseason.]

Another line which has been followed leads toward wide, rounded, amaryllis like petals. MEDALLION and KARISTA show this development. Mr. Ralph Wheeler has produced many flowers with full petaled compact form, notably CELLINI. My best red seedling in 1952 was a cross from this line into the almost glaring red flower TYROL from Mr. Wheeler. I consider this new red as good as GARNET ROBE although it is a satiny finish rather than velvety like GARNET ROBE. It has been named

TANAGER: [Large full flower of bright glaring red. A self of satiny finish. 36″ stems, Midseason. Dormant. (TYROL X KARISTA)]. RED PERFECTION and GARNET ROBE will be introduced into this program rather than flowers like SCARLET SUNSET as I am trying to steer away from narrow petals.

Plants seem to take delight in upsetting the breeder's theories, but now and then he gets a pleasant surprise. About five years ago I was spending much time in study of color charts and color systems. It occurred to me then that a combination involving greenish-yellow and magenta should have a better chance of producing blue than the selection of continually deeper reds. At the time my best chartreuse seedling was No. 46-75 (since named MARCY). I also had a group of magenta toned flowers, the best being No. 46-69. I decided to try out my color theory and bred these two. Every seedling from this cross was decidedly purple in tone and a few had a definitely 'blue' tinge to the color. The best one was tall, well branched with up to four flowers open on a stem at once, predominantly "Beetroot Purple" (RHS) shading out to a lighter border of "Lilac Purple" (RHS). This seedling has been named FAR HILLS. The red in this flower tends to fade so that by evening the effect is often almost blue-gray. The next step seems to be to purify the color by combination with the light background pink line. Luckily 1952 produced several seedlings in this line with either a lavender flush at the throat or a lavender dusting. These will be bred with FAR HILLS in an effort to produce a clearer blue.

So here seems progress toward both white and blue, and who can say where the future leads?

DAYLILY BREEDING PROJECT

W. R. BALLARD, *Maryland*

Unfortunate circumstances have delayed results in the breeding of good late blooming daylilies. After selecting 200 or more seedlings from a lot of some 15,000, the person from whom the land was rented decided to sell the property. This necessitated removing the selected plants and a block of young seedlings to a more restricted area. The extra work required for this operation and the lack of space has made it impossible to transplant later seedlings so that they could develop into blooming plants. As a result seedlings from two years' crossings are still in the nursery rows, and seeds of the 1952 crosses have been planted and will be ready for transplanting next year. Fortunately additional ground has recently been secured so that it will be possible to transplant the accumulated seedlings next spring and thus speed up their blooming.

There is one block of about 500 seedlings which have been transplanted and these should be sufficiently advanced to bloom next year. These are mostly of *H. multiflora* extraction.

The season of 1952 was spent largely in evaluating selections previously made and in crossing the more desirable types. Combinations were made with a number of named varieties with larger flowers and a greater range of color. Crosses were also made between the better seedlings. This involved considerable time and effort in labeling crosses, keeping records and collecting seeds. Planting of the seeds was made in the fall in nursery rows. Fall planting has always given a higher percentage of germination than any other method tried.

One small block of seedlings which came into bloom during the past season produced a few desirable forms. About 30 were selected for their potential breeding value. Particularly noticeable were a number with wide branching habit of growth.

The results to date in this project relate more especially to the accumulation of promising seedlings as a basis for further breeding developments rather than to the production of outstanding seedlings. However, some of the late bloomers could be considered worthwhile additions to the available sorts in this field. There are a number of seedlings in the collection which bloom in August and September. The range of color is developing and the size of the flowers is slowly increasing. This material together with the fine named varieties available in the mid-season group would seem to provide the makings of distinct advances in the development of the late flowering daylilies.

Time, of course, is the element most needed in the accomplishment of this end. This is one of the reasons for the anxiety to get the accumulated seedlings into bloom. Progress in the future is necessarily dependent upon what has gone before. Results so far would seem to indicate that persistent effort can be expected to yield dividends in the course of time.

SEED-BEARING LYCORIS RADIATA*

"Regarding the seed-bearing *Lycoris radiata:* the Georgia lady from whom the stock came back in 1950 answered my inquiry. She says that hers bloom early in August (that is about a month earlier than the regular *L. radiata*—sterile form—usually blooms here), and that hers always bear numerous seeds. 'I have many volunteer seedlings to grow'.

*Excerpt from a letter by Mr. S. Y. Caldwell (Tennessee) to Mr. Wyndham Hayward (Florida).

she added. Also she says that hers are just like those grown by her neighbors and the form has been growing in her locality for "as long as I know". But she also speaks of a later blooming form which some people have, but she does not. Apparently it is the sterile form that most of us have been growing for years. Evidently the seed-bearing *Lycoris radiata* were never so scarce as we thought. I am surely glad to have some of them now. My tentative conclusions are that they are somewhat hardier and more certain to bloom here in Tennessee than the sterile *L. radiata* I have. The flowers are a little smaller, on slightly shorter scapes, but they are earlier and a brighter red. I am wondering if the bulbs of *L. radiata* now being brought out of Japan will be like one or the other of the two forms I now have. Have any of your Japanese *L. radiata* ever made seeds?"—*S. Y. Caldwell.*

Editorial note.—A *Lycoris* sp. collected at Kwanshien, China, by Miss Josephine Henry while on military duty in China during the last war, and sent to the writer by Mrs. Mary G. Henry in 1949, turned out to be a form of *Lycoris radiata*. It bloomed under greenhouse culture in 1951 and 1952. The flowers were smaller than the usual sterile form, but no seed set was obtained under greenhouse culture. It may be that seeds will be produced under out-door culture.—*Hamilton B. Traub.*

VARIATIONS IN CALOSTEMMA

D. J. W. Chandler, *Tecoma, Victoria, Australia*

A little known gem of the *Amaryllidaceae* native to Australia, is the *Calostemma*. A pretty, easily grown bulb, it seeds freely and, when growing wild, shows wide variety in color and size of flowers. This characteristic shows the possibilities open to an enthusiast to hybridise the three (?) known species and to produce a greatly improved type.

A few miles from Adelaide, capital city of South Australia, *Calostemma purpureum* is found growing freely, but in an inferior type. The color is a dingy purple, the stems are short, and the general appearance is unattractive. Further north, a superior form of *C. purpureum* is found growing wild. My first introduction to this bulb in its wild state was to see thousands of what appeared to be pink nerines growing on a gravelly rise. Closer inspection proved them to be a pretty purple, and a spectacular sight they were, growing in masses in the short grasses of the sheep-grazing areas of the outback country. On another occasion I found masses of *C. purpureum* well established in deep rich loam, and in this case the stems were longer, the flowers were larger, with more substance and with more flowers on the stem. The different type of soil would account for the improved growth.

The most important feature noticeable was the color. Some were deep purple, some were light purple, others pink, and there were even white flowers amongst them. This variation makes me feel there are great possibilities ahead for selection and hybridisation. In the gravelly location, the bulbs were only 3″ to 4″ below the surface, whereas in the rich loam they were 12″ to 15″ down.

Like the nerines, *C. purpureum* flowers in the Fall before the leaves appear. The climate in South Australia, where both lots were found, consists of a very dry summer with a mild winter without snow and with very little frost.

The thousands of seeds that fall after flowering grow readily in the Spring. A bunch of flowers picked in March-April (Fall) and put in water set seeds, and the seeds each produced a small root a month later while still on the stem. These were planted, and although it is only early winter now, they are just coming through the ground. The early sprouting was doubtless brought about by the fact that during their period in water they were kept in a warm room.

A point of interest is the fact that nerines in Australia can be treated with success in this same way. The nerine flowers are picked, hybridised, and the seeds set whilst they are in water. The seeds are not planted until they show their small root.

Although three species of *Calostemma* are listed as natives of Australia, I have the impression there is still another species growing in the extreme north in the Northern Territory. It is reputed to be a very large purple flower, and it may be only a good type of *C. purpureum*.

C. purpureum is found growing in New South Wales as well as in South Australia. Wherever they grow, the bulbs average 1″ to 2″ in diameter, producing long thin leaves which appear after the flowers. The length of stem varies according to locality, and the number of half-inch bell-shaped flowers to a stem vary from ten to twenty. The length of stem in some cases is up to 2 feet, depending on where they are grown.

C. luteum, in my opinion, is the best of the three. The flowers are a little larger than those of *C. purpureum*, and it is found in New South Wales and Queensland. The color is bright yellow, and up to 15 flowers are borne on a stem. This appears to be a very hardy species, as it flowers freely under cultivation as far south as Victoria, where winter is more severe than in the States to which it is native.

C. album is a native of Northern Australia, and is quite distinct from *C. purpureum* and *C. luteum*. The white flowers are borne in umbels half an inch long, and the leaves are bat-shaped. This species needs a higher temperature.

Perhaps this short article will induce some of the *Amaryllidaceae* enthusiasts in the United States to hybridise and improve this beautiful Australian bulb. Any further information required will be freely and willingly supplied.

THE BEAUTIFUL AMARYLLIS IMMACULATA

E. O. AND MILDRED ORPET, *California*

In the 1940 Herbertia, Mr. James writes and illustrates the outstandingly beautiful *Amaryllis immaculata* which he had recently imported from the Argentine. The writers have flowered it here in 1950 and 1951. It is really one of the most beautiful sights imaginable to

Fig. 11. *Amaryllis immaculata* Traub & Moldenke. Photo by Mildred Orpet.

see a scape of these spotlessly white flowers as shown inadequately in Fig. 11. It flowers with the leaves which is a distinct advantage, and is on the whole a very fine garden subject. It has one disadvantage in not being very enduring as a cut flower. However, it may be that hybrids could be produced by crossing with other *Amaryllis* species which might be more lasting.

CRINUM SCABRUM

THAD M. HOWARD, *Texas*

The genus *Crinum* is a large one, with over a hundred species distributed in the tropical and subtropical regions of every continent. Although there is much variation in form and habit, their color range is somewhat limited. This is especially true in the section of crinums collectively known as "MILK-AND-WINE LILIES." In general, the crinums of this group possess flowers that are white with a center band of pink, rose or wine, a beautiful combination, but somewhat monotonous where many species are grown.

One particularly outstanding member of the MILK-AND-WINE group is so completely distinctive that one is almost startled when seeing it in bloom for the first time. This species, *Crinum scabrum*, is a gorgeous low growing variety with wide open flowers. Despite its showy blooms, handsome foliage and wonderful fragrance, it is little known. The flower may be compared to an *Amaryllis* L. in form. The broad, pure white tepalsegs are broadly banded through the center with a brilliant crimson stripe. The color scheme so strongly suggests a stick of peppermint candy, that it is commonly called "CANDY-STICK LILY."

While some *Crinum* fragrances are rather strong, *C. scabrum* is deliciously perfumed. A few CANDY-STICK LILIES in full bloom at night can perfume an entire garden. The flowers are quite large, being 8-9 inches in diameter. A full mature bulb will produce 2-3 stalks bearing 6-8 flowers per stem. The flower season is relatively short as compared to that of some crinums. Its usual blooming period is during the months of May and June. The flowers are of rather short duration, but its great beauty compensates for this.

Crinum scabrum produces large bulbs, 6-8 inches in diameter. In spite of the bulb's size, the neck of the bulb is short and narrow, and the plant itself is low growing as compared with most species. The flower scapes average about two feet in height. The attractive foliage is about 3 inches wide and very wavy.

[Howard—CRINUM SCABRUM, continued on page 63.]

4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

DAFFODILS IN PIEDMONT VIRGINIA

HARRY I. TUGGLE, *Virginia*

I became infected with the daffodil fever at the age of fifteen when I attended my first daffodil show. Since then I have grown over 550 varieties and have been a faithful exhibitor at Garden Club of Virginia's daffodil shows. My limited experience has convinced me that every gardener must determine for himself which daffodils are suited to his conditions—try them out for himself. It is also no startling conclusion to state that to grow daffodils well one must study his particular soil and climatic conditions. Located at the foot of the Blue Ridge, we are in the South's red clay hill region. Technically this red clay hill region is known as the "Cecil-Appling Area," and a gardener here usually has to contend with a red podzolic clay—a conglomeration of infinitesimal particles that is sticky and unworkable when wet and impenetrable when dry! If you want to grow daffodils in this red clay there is no alternative but to incorporate a copious amount of organic matter. Daffodils planted in unadulterated red clay will eventually suffocate. There seems to be no substitute for a soil well enriched with humus.

Devoting beds to daffodils exclusively has been found to be the simplest and best method of planting. Aside from organic matter, liberal quantities of sand and agricultural limestone have been added. A small amount of fertilizer has been used (chiefly 0-14-14), but fertilizers containing nitrogen have been avoided, for they encourage basal rot. Nothing, however, seems to take the place of a few inches of well-rotted manure under (not in contact with!) the bulbs. Manure makes an amazing difference in quality of bloom. After soil preparation, which is necessary primarily for aeration and drainage, or perhaps of equal importance, is mulching or planting a cover crop to keep the soil cool and moist in our hot, dry summer and fall. This may also be solved by a year-round mulch of sawdust which has additional advantages of preventing blooms from being splashed and spotted during heavy rains and eliminating the necessity of surface cultivation.

As to pests and diseases, there have been only three worth noting—virus, basal rot, and bulb scale mite. As the season advances aphids,

reported to be vectors of the various viruses (yellow stripe, mosaic, etc.) of the daffodil are in evidence. Planting as far apart as space permits is a safeguard against the spread of viruses or any other infestation, as well as means of improving quality of bulbs. I have been guilty of crowded planting and have felt it necessary to rogue and burn immediately any questionable plant. This has been expensive, but if only five healthy bulbs have been destroyed to each infected one, it has been worthwhile. Basal rot *(Fusarium)* may be a problem at times, but losses have been neglible under proper cultural and storage conditions. The only other pest noted here is the bulb scale mite *(Tarsonemus laticeps)*. This mite seems to thrive in our hot summers, and is usually responsible for those bulbs which are soft when lifted. Long necked and rough, scaley bulbs seem to be particularly susceptible to *Tarsonemus* attack.

Before attempting a review of daffodils, by R. H. S. Divisions, as they grow here, I should in fairness state my prejudices. I am an exponent of the British school which prefers a smooth perianth, good proportion or balance, and clear coloring *before* size and striking color which seem to be the main qualities sought by Dutch breeders. In my teens I was fortunate in being tutored by the writing of that great Irish grower and gentleman, Mr. Guy L. Wilson, V. M. H. I was able to visit the garden of Mrs. J. Robert Walker, who now supervises the Daffodil Test Garden of the G. C. of Va., here in Martinsville, and while in college at Charlottesville, I haunted the garden of Mrs. Fletcher D. Woodward. Both of these women have incurable cases of daffodil fever and are staunch advocates of the British or exhibition type daffodil. Mr. George Heath, of Daffodil Mart, Gloucester Co., who probably grows more varieties of daffodils than anyone, is the only person I know who seems to like one type as well as the other. I forthrightly prefer the exhibition type and grow but few of the decorative kinds.

For several years my main purpose in growing daffodils was to show them, but my interest in breeding daffodils now outranks showing them. Although there are many fine varieties that do well here, there is a distinct need for daffodils bred to meet the trying conditions of the red clay hill belt. I *hope* to be able to duplicate some of the foreign beauties in editions which will thrive here without extensive soil preparation and care. Now to the daffodils themselves—

King Alfred, Golden Harvest, and Unsurpassable were among the first varieties I planted, but I remained unimpressed by yellow trumpets until I came across Cromarty, a smooth, shapely deep gold. Garron, a large, pale lemon with splendid stem and foliage makes a vigorous garden clump. Hunters Moon looks and performs better than either parent—Brimstone and Moongold. Bastion, Braemar—said to have "jonquil" blood, Milanion—outstanding, and Royalist all do well here. Sulfur toned Mulatto wouldn't be exceptional later, but coming extra early it is valuable. A new Warnaar introduction, Joseph Macleod, has excellent form, carriage, and coloring—not like the somewhat typical Dutch trumpet which I had come to expect to have an

overly large trumpet in relation to the perianth. GRAPEFRUIT is promising, and PEKING, though smoothly colored, has poor balance. TINTORETTO is distinguished by a glimpse of pink in the base of its large sulfur trumpet. Large and vigorous, MOONSTRUCK has probably the most entrancing coloring of any daffodil—a symphony in cool lemonade tones. KINGSCOURT has been a good grower and increaser and is a superior exhibition flower, although our judges prefer the extra large 1-A's. KINGSCOURT could not have finer lines, or finish, but I must select GOLDCOURT as my favorite yellow trumpet. When well grown GOLDCOURT is only of moderate size. It is a precisely styled deep gold of leather like substance, the petals are tipped green and there is a suggestion of green at the base of the perianth segments. It is short necked, has a tall strong stem and superior carriage, and has a solid, clean bulb. What more could one ask?

There are few distinctly Bi-colored trumpets. Most of them have pale lemony coronas that fade almost to white in our sun—BRIDAL ROBE, GLENRAVEL, TROSTAN, etc. The earliest bicolor is BONYTHON which has good color, nice form, and is vigorous. It is followed by PREAMBLE and TROUSSEAU, the two finest. PREAMBLE is still in the settling stage here but has already exhibited fine form, good color contrast, and exceptional durability. TROUSSEAU is an entirely different type flower in form and color. Smoothly finished, TROUSSEAU has been a vigorous grower, and this spring as it aged displayed buffy cream coloring in the trumpet for the first time. EFFECTIVE has the most striking color contrast of them all—trumpet is bright chrome yellow. KILLYNURE, BALLYFERIS—with a white rim, CHATSWORTH, FORESIGHT—very short stem, GLENGARRIFF, and GREGALACH have all performed well. CONTENT really belongs in a class to itself,—a greenish tinted lemonade color on opening, but as it ages a whiteness suffuses the trumpet until only a lemon rim remains. In form it is a glorified BEERSHEBA, and it has a tall, strong stem, a factor lacking in SPITZBERGEN which could be termed squat as it grows here. DAWNGLOW has been lost twice which is regrettable, for it was better than PINK O'DAWN. OKLAHOMA has been described as a "smash hit" by one grower. It is to me, in the eye! It, like PRESIDENT LEBRUN, has what I once heard Mr. B. Y. Morrison call a "megaphone trumpet."

The white trumpets (and their close kin, the 2c's) are my favorites, but unfortunately they are not the best constituted to our conditions. Since BEERSHEBA there has been only one daffodil that surpasses it in every way—CANTATRICE. When in top form it can not be beaten on the show bench, and it would be difficult to imagine a daffodil with more grace or refinement. ARDCLINES and SAMITE are worthwhile, and DUNLUCE is a fine pure white that has not received its due on either side of the Atlantic. COOLIN is first rate (from NEVIS X BEERSHEBA), and just recently Grant Mitsch introduced an even finer flower named FAIRY DREAM with the same parentage. The dwarf stature of KANCHENJUNGA is inappropriate for its large, heavy blooms. It is eclipsed in every way by BROUGHSHANE which does not have the frilled trumpet, is just as

large, and has a much better stem. BROUGHSHANE often comes rough, but when in fine form is a magnificent thing. It hasn't reached the size here that it does in Ireland, but I like them smaller anyway. MOUNT HOOD is large and useful in the border, but is seldom fit for showing. CONTOUR is promising, and I'm looking forward to VIGIL (which has apparently inherited grace of its parent COURAGE) and PETSAMO this spring. HINDUSTAN, WHITE PROSPECT, WHITE MONARCH, and some of the other new, high priced KANCHENJUNGA or BROUGHSHANE offspring have not been too interesting from their pictures (a little *too much "Ajax"!*), but the photos of Mr. Guy L. Wilson's new EMPRESS OF IRELAND look like this master has come up with a pure white of size that still has style. I am going to find it hard to wait for that one!

SPELLBINDER, the only 1D, is also in a class to itself from the standpoint of quality. The only other reverse, BINKIE, a 2D, is the most reasonably priced of all the sulfur-limey-green types and should become a popular garden flower. It withstands the elements, multiplies rapidly, and is most telling in the border.

The solid yellow large cups (2 A's) have some fine daffodils in their ranks, but unfortunately they have little or no chance on the show bench if they must compete with the yellow-reds. A judge will almost invariably select a variety with a highly colored cup over a yellow cupped variety in sections A & B of both the large and small cupped daffodils. Here might be as good a place as any to comment on my pet peeve about daffodil shows-judging. There are many excellent judges, but I feel that there are too many men and women judging horticultural classes in present day flower shows who do not have an intimate or first hand knowledge of the flowers they are judging. No short course at any college or judges' school can take the place of the school out in the back yard,—garden experience in growing the flowers they judge. Often in looking at some classes at daffodil shows in which I feel there has been an injustice committed, I figure that the judge may be well qualified as far as points on his or her diploma or certificate is concerned, but he or she has quite a limited knowledge of the fine points of the daffodil!

Back to the 2A's—almost of trumpet proportions GALWAY is among the daffodil elite. ST. ISSEY is a large, strong, tall stemmed, deep gold that blooms early and lasts. GOLDEN TORCH after settling down is proving to be another topnotcher, and I am still not prepared to give up BALMORAL, CROCUS, TRENOON, or ST. EGWIN.

Yellow-red large cups are legion, but I could never become enthused over them until I gazed in awe at the daffodils flown over by Mr. J. Lionel Richardson of Waterford, Ireland for the 1952 Garden Club of Virginia Daffodil Show in Staunton. I, like others I'm sure, had read the glowing catalog descriptions of these "flame-red, blazing orange-red, intense cadmium orange-red, etc." cupped flowers only to grow them and be disappointed with their color. I had begun to doubt the reliability of catalog descriptions, until I helped unpack those Irish beauties. Their color stunned me to such an extent that I was almost prepared to move to Ireland! After 30 hours in air transit, they were veritable

jewels! The large blooms, carried on stems up to two feet in length, had startling color. All the raving over KRAKATOA, FIREMASTER, CEYLON, SUN CHARIOT, etc. is justified, and if you are skeptical come to the 1953 show (to be held in Williamsburg in April) and see for yourself, for Mr. Richardson is honoring us with another exhibit.

Among the best of the yellow-red 2A's here are: ARANJUEZ—nearly every bloom of show quality, BAHRAM—good about every other year. CARBINEER—superior form but seldom colored, COTOPAXI, CORNISH FIRE—early, brilliant, and sunproof, DUNKELD—superb, but fades, DERVISH, DIOLITE—cool yellow except for red rim on cup, GARLAND—round perianth segments, INDIAN SUMMER, NARVIK—perhaps the best of the whole lot here, MEXICO, MAGHERALLY—small, brilliant almost ruby red cup at times, SALTASH, SUN CHARIOT—improves with age, and TAMINO. In four years KRAKATOA has had fair color once. Many more have been tried and discarded in this group which has a wide range of selection. ARMADA and CEYLON are looked forward to this spring.

Class 2B now serves as a repository for many different types which I subdivide white-buff, white-red, white-yellow, and white-pink. In the first group BIZERTA is on the order of POLINDRA only it has an apricot crown. It has exceptional durability. BUNCRANA, BREAD AND CHEESE, and PENVOSE are dependable. MONACO after four years was unusually good last season. RUBRA is hard to surpass for cutting. Its small size makes it unsuitable for showing, but it couldn't have finer form.

Noteworthy white-red large cups are scarce, and good early ones are virtually non-existent. The best one I've grown so far is KILWORTH, but it unfortunately sags its head. RED HACKLE is an exemplary late bloomer, becoming deeper with age. FLAMENCO had a bright orange-red crown last season, previously it was only orange. These three are valuable for they do not fade in our sun. FERMOY is good, but takes time to develop for it opens almost as a 2A. DICK WELLBAND, FRANCISCUS DRAKE, and most of the Dutch and Backhouse strain of highly colored red cups fade or burn badly. Reliable reports indicate that SIGNAL LIGHT is a milestone in this group. I must state an emphatic distaste for the whole series of JOHN EVELYN hybrids. They may be striking garden plants from a distance, but on close inspection they are coarse and ill proportioned.

The white-yellow large cups include many former Leedsii, one of the best of them for either cutting or the garden being BRUNSWICK. It opens with a pale lemon cup, but gradually fades to almost pure white. Tall stemmed, vigorous, a long laster, good increaser, fine bulb—for everything but showing BRUNSWICK is tops. There isn't enough contrast to make it a good show flower. Several daffodils have been rather hopefully described "improved POLINDRA" but it has been only wishful thinking! It would be hard to imagine an improvement on POLINDRA. STATUE is larger, and similar, but is by no means a replacement. GREEN ISLAND, after four years, has settled down and has faultless blooms. I was admonished by visitors for not saving several for the show, but this spring was the first full length daffodil season I'd enjoyed for five

years (a four year lapse for college), so I selfishly kept my favorites. CARAGH has a pretty apricot rimmed flat cup, and GREETING is another that will be hard to surpass. Its perianth tends to reflex, which only serves to set off the goblet shaped primrose cup. GUARDIAN is a near trumpet and a prolific seeder. It is the progenitor of the beautiful new white trumpet EMPRESS OF IRELAND. Special recognition is due TRYST which bloomed late during an 80 degree spell and seemed impervious to the heat! GENTILITY is a vigorous improvement on WHITE SENTINEL which has done miserably here. Incidentally I have yet to come across a clean (virus-free) stock of either WHITE SENTINEL or MITYLENE.

The pinks are *á la mode* these days. I wonder about the advisability of this public favor since *few* of them are of top quality—if you still demand other requisites before pink coloring. I have grown the whole lot of Dutch-bred MRS R. O. BACKHOUSE derivatives—ANTIBES, BIARRITZ, CANNES, CHAMPAGNE, PINK FANCY, PINK FAVORITE, PINK GLORY, PINK RIM, PINK SELECT, SIAM, etc. After several years' trial I did not plant any of them back last fall, for they are uniformly poor formed flowers—distorted cups, excessive frills, twisted perianths, etc., and their color has been poor here. The best of the Dutch pinks that I've come across are LADY BIRD and ROSY SUNRISE, but they leave much to be desired. ROSY DIAMOND is a small one with a real rosy-pink cup, a gem. MABEL TAYLOR is usually rough but has an intensity of pink in its trumpet-like crown that is seen in no other. LISBREEN, ANN ABBOTT, PICTURE, FOYLE, and WILD ROSE are good off and on. ROSE OF TRALEE is perhaps the best formed pink, but this late bloomer has a poor bulb and is temperamental here. MOYLENA and INTERIM show promise, MOYLENA being the best of the MITYLENE X EVENING series of pinks.

Opening the 2-C season is ZERO, of clarion quality, a faultless pure white. NAMSOS has been a poor grower, as has its parent NIPHETOS. NAXOS is reported to be "touchy," but it thrives. CLEENA—a white FORTUNE, COTTERTON—an immaculate icy white on short stems, COURAGE—very graceful, GLENDALOUGH, MORNING WINGS—charming, JUSTICE, KILLALOE—semi-ajax, MURMANSK—good off and on, ST. BRENDAN—almost of trumpet proportions, PARKMORE, SHINING WATERS—early and durable, and TEMPLEMORE are all noteworthy. LUDLOW is sometimes spoken of as an improvement on TRUTH, I wouldn't give up either. GREENLAND is attractive from the breeding standpoint for its triple substance and almost green-white color. MOVILLE has been weak, and SLEMISH has succumbed twice. TIBET should make a stunning border plant. A shapely white from Barr that is as good for showing as in the garden is SILVER BUGLE. There are many invalids in this group, and there should be a demand for vigorous 2C's bred to take our growing conditions.

When smooth, CHUNGKING is outstanding, but it is inconsistent. It is a rapid multiplier and has to be lifted every year or planted deeply to secure bloom. Superbly formed, late, small, with greenish yellow perianth, DINKIE couldn't be overlooked. CARRIGART is a fine decorative type, as is popular MANGOSTEEN, and THERM has a small, intense red cup.

With 20 inch stems, MISTY MOON is the best of the MYSTIC X DACTYL tribe of charming flowers now classified as 3-B's. SYLVIA O'NEILL and TINSEL are members of the deservedly famous SILVER COIN series. ANGELINE is white except for the penciled rim of copper on the small cup. There are many outstanding white-red 3-B's, but they have to be watched closely for all of them burn. The following are of ideal show quality, but judges lately seem to prefer larger flowers of the KANSAS type to these more polished ones: BLARNEY—flat salmon-orange crown, BRAVURA, CRETE, FORFAR, LADY KESTLEVEN, LIMERICK—with cherry red crown, a refined and improved edition of HADES, MAHMOUD—superior in every way except that it has inherited SUNSTAR's long-necked bulb, MR. JINKS, MOINA, PERA, QUETTA, etc.

The 3C's aren't too vigorous here. CHINESE WHITE is of paramount importance in this group, in fact it is one of the notable daffodils of the century. FOGGY DEW is larger and more vigorous, but its form and color can't approach CHINESE WHITE. ALTYRE is a notable addition, and CUSHENDALL with its moss green eye is one of the most captivating of daffodils. PORTHUSH appears to be an enlarged edition of CUSHENDALL but is not as refined a flower. FRIGID blooms so late here that heat will not allow it to develop properly.

DAPHNE is one of the few doubles I ever cared for, but it is not easy to grow. SHIRLEY TEMPLE is a fine newcomer.

It is gratifying to see interest increasing in *N. triandrus* hybrids to such an extent that a stalk of SILVER CHIMES was selected as best flower in 1952 G. C. of Va. show. Its foliage is often bitten back here, but it blooms well. The charming APRIL TEARS (*N. jonquilla* X *N. triandrus concolor*) has retained some of the "*jonquil*" odor; HAWERA is similar to it. RAINDROP is a delightful midget but is tender. TRESAMBLE—an improved edition of ACOLYTE, THALIA, and RIPPLING WATERS are dependable. COBWEB is similar to one of my favorite daffodils—Rev. Engleheart's incomparable DAWN—flat cupped with petals pertly reflexed and waved, it looks ready to fly away. Unfortunately the *N. triandrus* hybrids, which are so admired by arrangers, are particularly susceptible to stripe.

The sensation among the *N. cyclamineus* hybrids is justly Mr. C. F. Coleman's fascinating series from MITYLENE X *N. cyclamineus*. JENNY and DOVE WINGS both have white perianths and limey-yellow cups, and CHARITY MAY is different from usual type of solid yellow *N. cyclamineus* hybrid. I am fortunate to be growing these and hope they will show more vigor when settled.

SHAH is a new, large cupped jonquil hybrid that looks like a smaller, yellow edition of DAVA. It will be hard for anyone to excell TREVITHIAN. A clump in the garden has had foliage and blooms almost waist high, and little trouble is experienced in selecting stalks to show. CORA ANN, HESLA, and TRIM are different types from the average 7-B and are usually single flowered. No collection would be complete without the unique, pink cupped CHERIE.

I have grown few tazettas or poetaz, and relatively few poets. Old ACTAEA is dependable (unusually long necked), and smaller SHANACH, CANTABILE, DACTYL, and SMYRNA are fine if planted deeply and not disturbed, but a combination of round perianth segments and a flat, deep green eye edged red make SEA GREEN about the finest poet.

Talking daffodils is apparently as engrossing as growing them. Just what is it that makes growing these patricians so fascinating? I think A. M. Kirby back in 1907 gave an admirable answer in his little book on the daffodil: "It is not alone the individual and collective beauty of their flowers that endears them to our hearts but the bravery of their advent, for 'the time of the daffodil' closes the gates on bleak winter and ushers in, with trumpets of gold, longed-for spring."

OLD NATURALIZED NARCISSUS IN THE SOUTH

JO N. EVANS, *Louisiana*

If you are driving through Louisiana, Mississippi, Alabama or Georgia during the winter months, you will see *Narcissus* blooming in almost every yard. You will often see old cemeteries that are carpeted with these bulbs; if you look you will see them blooming in fields where an old home once stood or they may have wandered off down the ditch banks, or even along the side of the road.

You will, perhaps, wonder who planted these bulbs,—how did they get there and what *Narcissus* could they be? They are the old *Narcissus* of early southern gardens, probably some of the very first flowers to be brought to this country.

The first of these old bulbs to bloom is a pure white Tazetta or cluster type, on a stem not taller than six inches and we can usually gather them at Thanksgiving. The next *Narcissus* to come into bloom has a taller white cluster, much like the paperwhite of today's commercial trade. By Christmas a tall, creamy white Tazetta is in bloom, this one has pointed petals and very tall stems; it is locally called Star or Christmas *Narcissus*.

The first of January finds PEARL in bloom. This is the most beautiful of all cluster *Narcissus*, it has large heads of flowers and tall stiff stems, the substance of the blossom is very heavy. When Jan de Graaff was a visitor at Haphazard Plantation recently he told me that PEARL was the same name that this bulb was called in some very old books on *Narcissus* that he owned. By the middle of January the little yellow trumpet—*N. minor* is in bloom, this one is a very sturdy little bulb, the weather never seems to bother it. It gives our southern gardens a lot more color than the early February Gold does.

In the latter part of January our true love comes into bloom, the little white trumpet Swan's Neck [Fig. 12]. This is not to be confused with the little white trumpet in the commercial trade, J. P. Milner, because the former has much more character and charm.

During February the short cupped daffodils bloom. Some of these are just as beautiful as the modern named varieties—others are not so

Fig. 12. Hybrid Narcissus—Swan's Neck as naturalized in Louisiana. Photo by Lillian Grey

good. There are no local names for these and one has to select them while in bloom. The little species *N. poëticus* is locally known as White Lady, it is a very nice little bulb with blossoms about the size of a fifty-cents piece.

When we see these old bulbs blooming in such profusion, even where they have been left undisturbed fifty years or more, and growing under most any kind of conditions, one wonders what has happened that makes the large modern *Narcissus* so intolerant of our southern gardens. Perhaps the modern breeder has had no interest in southern gardens or, perhaps he did not realize he was taking the south out of the bulbs as he developed them for northern gardens.

DAFFODILS IN 1952

GRANT E. MITSCH, *Chairman, Narcissus Committee,*
Canby, Oregon

"To go or not to go" is a question provided annually by various Daffodil shows in this area. The sponsors like as many exhibits as possible from commercial growers, and one who raises seedlings is loath to be absent from home when new crosses are coming into flower; particularly so when the blooming season is short, and is interspersed with inclement days, making the time to observe and study the flowers brief at best. Yet, in spite of one's reluctance to leave them, it is the ordinary procedure to spend a goodly percentage of time away from the flowers after spending months in anticipation of their opening!

Too frequently the weather is unpropitious during and preceding the blooming period. Following a series of severe winters, the past one proved more nearly normal for this section, and while we had our usual late fall frosts, they were insufficient to halt the blooming of Polyanthus Primroses and other flowers of the hardier clan. Damp mild weather continued until the first of January when the temperature dropped to about ten degrees below the freezing point and gave rise to fears that we might again be due for severe weather; but that was not to be, and there were comparatively few frosty nights after this date. There were two damaging frosts at about the end of the season but Daffodils suffered little.

As usual, our first flowers were from *N. asturiensis* opening in late December, a record with us. A few days later *N. bulbocodium* X NYLON opened, soon to be succeeded by *N. romieuxii;* the former is reminiscent of *N. bulbocodium* var. *monophylus,* one of its parents, I believe, and the latter carried some of the sulphur lemon tones so much sought after in large trumpet varieties. Not long after these bloomed, *N. cyclamineus* opened its jaunty, spritely blossoms which briefly preceded those of its descendants, MITE and FEBRUARY GOLD. The former is most cheerful with its perky little blossoms with perianth segments somewhat less reflexed than in its parent.

There were a number of potted large flowered Daffodils grown as well as the species and their first generation hybrids. CONTENT (Fig. 13) and TRUTH gave superb blooms as usual, and FAIRY DREAM and ROSTOV were very lovely, but these will be passed by to consider some of the later blooming species. *N. triandrus* var. *albus* is always delightful when well grown. *N. juncifolius* and its near-kin, *N. rupicola* are intriguing elfin flowers, but one of the loveliest of all was *N. watieri* as grown in a box of perhaps 50 bulbs, with many pure white, fairy-like blossoms bidding for notice.

Although there were few frosts, the temperature hovered just a few degrees above freezing so much of the time that plant growth advanced

but little for weeks after the turn of the year. None of the very early varieties came on until after the first of March in the open, unprotected field. The first blooms of FEBRUARY GOLD, MARCH SUNSHINE, MITE, CIBOLA, SACAJAWEA, and FORESIGHT opened almost simultaneously. The earliest of the large golden yellow Daffodils with us, CIBOLA is a flower

Fig. 13. Hybrid *Narcissus*—CONTENT. Photo by Grant E. Mitsch.

of excellent keeping qualities. It has quite a broad, flat, smooth perianth, and a large bell-shaped crown, broadly flanged and reflexing as it develops. It should prove an excellent cut flower. Just as early, and also a large flower, SACAJAWEA, a FORTUNE x KIMBA derivative, is somewhat reminiscent of WHITELEY GEM but twice as large and has preceded it in bloom here. Having somewhat more pointed perianth segments than FORTUNE, it is about the same size flower with clean yellow coloring except for a wide band of orange red on the crown.

While waiting for the first field blooms to open, we were enjoying some beautiful pot grown Daffodils, but one is never quite satisfied with only those grown under controlled conditions, however perfect they are, for the call of the out-of-doors cannot be evaded by the true gardener! One only wishes that the flowering season were longer! Counting some of the miniature species which open indoors, there are about four months of continuous bloom, but the bulk of the large flowering garden varieties come and go within a period of six weeks, and in even less time some years. Even though the winter was comparatively mild, our season was a brief one this year; for once the flowers were well started to opening, a succession of warm days brought on everything rapidly. Among the rather early flowers are some seedlings from MITE and MALVERN GOLD, one of which bears very perfect little flowers with smooth flat perianth, and rather a long, well balanced crown of clear lemon yellow throughout. A good increaser and free bloomer, it carries its flowers with good poise on stems more or less tinted with yellow. This dainty star-like Daffodil has been named ESTRELLITA. Another seedling of *N. cyclamineus* ancestry and of rich golden yellow coloring is usually the first of all to bloom, excluding the species; the seed parent in this instance being MAGNIFICENCE. Others of their clan to which we look forward to seeing each year include PEPYS, TREWIRGIE, GOLDEN CYCLE, and PEEPING TOM, the first named being particularly interesting and unique, but unfortunately, rather slow on increase. Even more distinct is CYCLATAZ which made its first appearance here this year.

The miniatures include some very fascinating members among their numbers, and we were much intrigued by the perfectly formed TANAGRA a larger descendent of *N. asturiensis*. The jonquil family includes several most delightful representatives, perhaps the finest of all being APRIL TEARS which gives generously its graceful stems carrying two to four exquisite pendant blooms of clear yellow with slightly paler coronas. To the same coterie belongs the somewhat paler and easier blooming HAWERA, and the smaller PEASEBLOSSOM; and of quite different form but still most appealing are BEBOP, SUN DISC, and LABELLE, each a little jewel. Of still different type and ancestry is HIAWASSEE, a "Paper White" hybrid, which appears quite hardy but is not always a free bloomer;—perhaps severe cold may be a deterrent to its flowering, as this year it performed better than ever before.

Although we had anticipated exceptional bloom this season, Daffodils on the whole were of about average quality. Many of the red cups were especially fine and came with stems of exceptional length, due perhaps more to soil and situation than to weather. Coloring was very good on DIOLITE, BAHRAM, ROUGE, and many others, and they were taller than I had previously seen them. There were many splendid large flowers of KRAKATOA with most vivid orange red crowns. ARDOUR was beautiful as usual and came relatively earlier than normal this year. Nigeria is always good but seemed to surpass itself, while CALIFORNIA GOLD stood out as a most strikingly colored flower and would have been near the very top in quality except for a long neck. Both ARMADA and CEYLON

are examples of the strides being made by breeders, the former being of excellent quality and a most striking flower, while the other approaches the ideal in quality and finish. Both develop much of their color after first opening and hold it well whereas so many red cups tend to fade out after being open a few days. There was some variation in the performance of the later blooming yellow-reds this year for GARLAND which ordinarily has a crown of quite solid coloring came with orange at the base of the cup and a distinct band of deeper shade, making it resemble a larger ARANJUEZ.

Fig. 14. Hybrid *Narcissus*—BINKIE. Photo by Grant E. Mitsch.

Improvements are now difficult of attainment in the class under consideration. A seedling described before and now named PARACUTIN, from KLINGO x ARDOUR came somewhat rough this year but still carried about the most fiery orange red coloring that we have observed in a

flower of this type, a shade more nearly approaching that found in some of the red and white daffodils.

Those varieties having white perianths and colored crowns were somewhat better on the whole this year than some seasons, even the older variety, LADY KESTEVEN having retained its brilliance for several days in warm sunshine. As usual, CRETE was one of the finest of this group being possessed of a most beautiful rounded perianth of much substance. MATAPAN, OTRANTO, PAPRIKA, and TEBOURBA came with beautiful form and intense brilliance. As a garden flower, there is certainly nothing to excel LIMERICK, which is quite late in blooming. A seedling from LADY KESTEVEN and HADES which has been carried for several years was quite impressive with its white rounded perianth and brilliant crown, nicely frilled at the edge. Among varieties with larger crowns, FERMOY, KILWORTH, and MONACO were impressive again this year, while SIGNAL LIGHT looked promising in its first blooming. Some years ago among our seedlings appeared a very frilly orange cupped flower from open pollenized JOHN EVELYN. This was crossed with SCARLET LEADER and from the few resulting seedlings two or three were exceptionally early blooming and had large rounded white perianths with good sized crowns of rich orange red. While the coloring is not very lasting and the flowers could stand additional polish, they provide a bright spot very early in the season.

Some of the best yellow trumpets came from KINGSCOURT x GALWAY, while from CAMBERWELL KING x MORTLAKE, and from CAMBERWELL KING x GALWAY there are several seedlings that look very promising after having bloomed two or three years . But it is the KING OF THE NORTH x CONTENT group that gives most of interest, including clear yellows, pale sulphur lemons, and reversed bi-colors. Three of the latter were the best in this class that we had this year, having well formed, smooth flat lemon perianths, and finely balanced, nicely flanged trumpets which, as they developed, became almost white inside. The clear lemon-self, FRONTIER, was the best we had ever seen it this year, and MOONSTRUCK gave superb giant size blooms. GRAPEFRUIT and MULATTO were not quite up to par, while SPELLBINDER and MOONRISE looked good on their first appearance. We have bloomed numerous seedlings from BINKIE (Fig. 14) but none to equal it.

In white trumpets, the very refined and highly polished CANTATRICE still maintains its position at the top of the list, although BROUGHSHANE and KANCHENJUNGA (Fig. 15) by virtue of their spectacular size and form elicit much more comment from visitors. A seedling from ADA FINCH x FORTUNE which we have grown for some years is considerably larger than either of the above, and while far from ideal in form and balance, it has many good habits, and is so striking that few visitors can see any other white when it is in bloom. From KANCHENJUNGA x ZERO and ZERO x CANTATRICE the average of good white flowers was exceptional. Good form and purity were the rule here but it remains to be seen whether they have sufficient stamina and vigor. With such good whites as ZERO, LUDLOW, TRUTH, KILLALOE and others available it is difficult to make improvements in their class.

GREEN ISLAND (Fig. 16) has again demonstrated its value for breeding as several of the finest flowers of the season came from it. BREAD AND CHEESE x GREEN ISLAND produced three or four very fine flowers of which the best had an exceptionally large, geometrically perfect white perianth and large bowl shaped crown. From POLINDRA x GREEN ISLAND there were numbers of satin smooth beautifully formed flowers with cups tinted lemon or apricot, and a large series from TUNIS x GREEN ISLAND included so many interesting flowers that it was difficult to make selections, so many inherited much of their pollen parent's

Fig. 15. Hybrid *Narcissus*—KANCHENJUNGA. Photo by Grant E. Mitsch

form, with colorings in the crown associated with TUNIS seedlings, including buff, apricot, and salmony tones together with cream, ivory, and soft lemon. Many give promise of having immense vigor, and should be good garden or exhibition flowers. As reported before, the interesting series from GREEN ISLAND x CHINESE WHITE include some of the most satisfying, perfectly moulded flowers we have grown, but from such parents it is difficult to make improvements. Although variety in coloring can be added. The pink from GREEN ISLAND x GLENSHANE was not

quite so fine as last year but was still very nice, and several more with pink tintings appeared among its sister seedlings.

This was not a particularly good pink year as many of this color were lacking in their usual depth of tone. MABEL TAYLOR was less striking than a year ago and ROSARIO was paler than some seasons. Many others including WILD ROSE, most of the Australian, and the Dutch pinks did not find the season to their liking. The same was true with many of the seedlings although a few gave us better color than normal. Perhaps the most vivid, glowing, orange toned rosy pink came

Fig. 16. Hybrid *Narcissus*—GREEN ISLAND. Photo by Grant E. Mitsch.

in a flower from a seedling crossed with INTERIM. Another good sized, well formed flower from a ROSARY x MRS. BACKHOUSE seedling crossed with MABEL TAYLOR was nearly its equal in brilliance. Most of the pinks either do not hold their color long, are indifferent in form, or are fickle in performance; being good one year and not the next, or proving outstanding in one region and mediocre in another climate. Perhaps eventually, out of the many thousands of seedlings being grown by hundreds of fanciers, a really good pink of consistent performance will appear.

Good bicolor trumpets are not plentiful but among the large cupped varieties this is one of the strongest color groupings. PREAMBLE, SPITZBERGEN, TROUSSEAU, TROSTAN, and GLENGARRIFF are about the best of the trumpets, but only the first mentioned one is a strongly contrasted bicolor. Of the large cupped kinds, it will be long before POLINDRA and BODILLY are replaced although there are many fine new ones that are distinctive in form, among which is STATUE, an elegant, tall, giant white with lemon crown. At its best, SEBASTOPOL is well near perfect but in some seasons the perianth is not sufficiently clean, having a slight olive cast. TUDOR MINSTREL looked promising on its first blooming here, and a seedling which we call FESTIVITY has given us immense blooms with perianths of good substance and so flat they appear to have come from a press. Were it not for its habit of tilting downward at an angle when freshly opened it would, we think, be the peer of all in its class.

Among the most unique of the Daffodils we have bloomed is ARTIST'S MODEL, a large flower with white perianth and quite large nearly flat crown of salmon orange with a recurved flange pressed back against the perianth. Several other flowers from the same grower, Mr. Lewis, in New Zealand, mostly varieties on the border line between large and small cups, have proven good here. They have rounded white perianths with crowns of yellow or ivory, bordered with various shades of orange, lemon, and apricot. AUTOWIN, MARIE LOUISE, PAPANUI QUEEN, and SATIN QUEEN are a few that appear to be best and well worthy of growing, all of them being late flowering. The lovely GALILEE is of somewhat similar type; perhaps not quite as large but a bit smoother.

To finish the season we are treated with poets and the ethereal, cool green eyed flowers of which CUSHENDALL, DALLAS, and FRIGID are favorites with us. As we had quite warm weather after the early flowers opened, the season was short and there was too little time to fully enjoy the Daffodils, but like always, there were compensations for every disappointment.

DAFFODILS IN NORTHERN CALIFORNIA

HAROLD I. JOHNSON, *California*

The following comments on daffodil varieties, arranged according to originator, may be of help to those who wish to try out daffodils under conditions similar to those in Northern California.

Daffodils do well in this region, and my one recommendation as to growing them would be that not too much water be provided in the summer months, especially in the heavier soils. Thorough watering once a month should be sufficient. Winter watering however, is desirable, particularly in December, January and February, if good rains are not forthcoming.

The other main factor is choice of the variety. I have listed all that I have grown with special comments on the outstanding and good, and the rest clearly written between the lines.

P. D. Williams. If any one of these hybridizers can be said to have introduced the varieties most suitable for our conditions, it is P. D. Williams. His daffodils are of Cornish origin, in the southwest of England.

The varieties I have grown of his are: ALIGHT, BODILLY, BRUNSWICK, CARLTON, CONTENT, CORNISH FIRE, CROCUS, DAMSON, GODOLPHIN, GREETING, HAVELOCK, JUBILANT, KENNACK, KILLIGREW, LANARTH, MEDUSA, MESSINA, NIPHETOS, PENBEAGLE, PENQUITE, PENTREATH, POLINDRA, PORTHILLY, ST. AGNES, ST. EGWIN, ST. IVES, SALTASH, SCARLET GEM, TREVISKY, TRIM, TROUSSEAU, TUNIS and WARLOCK.

Of these, CONTENT (Fig. 13) is the most outstanding in size and quality, and seems reasonably well adapted to our climatic conditions.

The most prolific and easiest to grow is CARLTON.

The good garden flowers are: ALIGHT, BODILLY, GODOLPHIN, LANARTH, PORTHILLY, ST. AGNES, ST. EGWIN, SCARLET GEM, TRIM, TUNIS and WARLOCK. All of these are strong growing with good stems; and in the now several years I have had them, have shown no signs of temperament. BODILLY, PORTHILLY and ST. EGWIN provide the most in garden value, though I would not want to be without the cluster-flowered SCARLET GEM or the jonquils, LANARTH and TRIM.

Flowers of great beauty, but not too satisfactory as growers, are BRUNSWICK, CROCUS, GREETING, POLINDRA and TROUSSEAU. They can well be tried, and I know POLINDRA grows beautifully along the immediate coast, judging from Mr. Reinelt's garden; but in my experience, they are touchy.

The rest are in most respects superseded, although PENBEAGLE and PENTREATH, because of their fine bulbs should be considered for breeding purposes.

BRODIE OF BRODIE. Of many flowers introduced from the garden of Brodie of Brodie, very few are truly outstanding under my conditions. His garden was in Northern Scotland.

Among those I have grown are: BOKHARA, CAPRI, CHEERIO, CHRISTIAN, COURAGE, CROMARTY, DAVA, DUNKELD, ELGIN, ESKIMO FAIRY CIRCLE, FIREWATER, FOREST FIRE, FORTUNE'S BLAZE, FORTUNE'S BOWL, FORTUNE'S CREST, FORTUNE'S SUN, KING OF THE NORTH, MARKET MERRY, MARMORA, MR. JINKS, NISSA, PAINTED LADY, POLDHU, PORTLIGHT, QUETTA, TOPIC and WHITELY GEM.

The good garden flowers have been: BOKHARA, COURAGE, FOREST FIRE, FORTUNE'S BLAZE, FORTUNE'S SUN, MARKET MERRY and WHITELY GEM. Of these, MARKET MERRY is the most outstanding in good years, but I would settle for BOKHARA as being the most satisfactory from all-round garden value.

ELGIN, FIREWATER and PAINTED LADY may be tried, because they will provide beautiful flowers under the best conditions, but the others I would not buy again.

A. M. WILSON. A. M. Wilson introduced very few but some quite fine daffodils. Those I have grown are: ANGELINE, CARBINEER, CICELY, DIPLOMAT, GARIBALDI, KING OF HEARTS, LUDLOW, OSLO and SCANDAL.

Of these, LUDLOW is the most outstanding because of its lovely white color and good carriage. CARBINEER is a very strong grower, but the color is not outstanding. ANGELINE and CICELY are fine cutting flowers particularly suitable for flower arrangements. OSLO is lovely, but dies out. The others are probably now superseded.

De Graaff. Of Dutch varieties introduced by De Graaff, I grow: CALORAMA, CRITERION, DAISY SHAFER, GOLDEN PERFECTION and PEKING.

GOLDEN PERFECTION is fine from all standpoints. DAISY SHAFER can be pleasing, but the others are either superseded or unsatisfactory.

GRANT E. MITSCH. Grant E. Mitsch of Canby, Oregon is one of the younger hybridizers, and undoubtedly there will be many fine introductions from his garden in future years. His introductions so far are primarily intended for garden rather than exhibition use, and I grow CASABIANCA, CHINOOK, CIBOLA, FAIRY DREAM, GOLD CROWN, LEMON DROPS, LINN, PAUL BUNYAN, SANTIAM, and ZEST.

Fig. 17. Hybrid *Narcissus*—PAUL BUNYAN. Photo by Grant E. Mitch.

The best of these is PAUL BUNYAN (Fig. 17) with enormous size and fine carriage. LEMON DROPS is a very distinctive triandus type.

The fine garden flowers are: LINN, SANTIAM, CHINOOK, CIBOLA and CASABIANCA.

The others are not particularly distinctive but except for FAIRY DREAM which appears to require more rainfall than California usually provides, they are all good growers.

KENYON REYNOLDS. Some originations of Kenyon Reynolds of Southern California were introduced by Mrs. Lena Lothrop some years ago. I have grown COMANCHE, GAY DANCER, MARIPOSA, TEMECULA, and Seedlings No. 9, No. 31, No. 65 and No. 212.

COMANCHE is a very good variety and the Seedlings numbered 9, 31 and 65 are all good garden flowers.

MRS. R. O. BACKHOUSE. Of the Mrs. Backhouse introductions, I have grown, including CORONACH, ECLAIR, HADES, ISIDOOR, MRS. R. O. BACKHOUSE, NORFOLK, PEERLESS and WHITE CONQUEROR, only HADES seems worth growing, and that primarily for color.

CORONACH can be tried for hybridizing, but it is a poor doer.

VARIOUS GROWERS. I have grown miscellaneous daffodil varieties from various growers as follows: ALBERNI BEAUTY (Hilton), ARANJUEZ (Warnaar), BEERSHEBA (Engleheart), BRIMSTONE (Engleheart), CHERIE (W. F. Mitchell) DIOLITE (Miss Evelyn), FORTUNE (Ware), JOHN EVELYN (Cope), KING ALFRED (Kendall), MITE, NIVETH (H. Backhouse), PENCREBAR, RIO RITA (Warnaar), ROYALIST (Lower), RUSTOM PASHA (Miss Evelyn), SILVER CHIMES (Martin), and SILVER PLANE (A. E. Lowe).

Of these, FORTUNE is still the most outstanding and useful in the garden, while KING ALFRED, although completely superseded as a specimen stalk, seemingly enjoys our climatic conditions. Others in the outstanding class are DIOLITE and RUSTOM PASHA.

Good garden flowers are ROYALIST and CHERIE.

ARANJUEZ, MITE, PENCREBAR, and SILVER CHIMES are sufficiently distinct to be tried, but the last named has proved difficult. The others are either superseded or unsatisfactory.

AUSTRALIAN—NEW ZEALAND GROWERS. The Australian-New Zealand introductions I have tried are AVENEL, BINKIE, BONNY, CAMBERWELL KING, CARMOA, CARNGHAM, CHARIS, CORONELLA, CRANBOURNE, CRUSADER, DAVID WEST, EVANSFORD, FAHAN, FIDELIS, GLENALBYN, GLEN ALVIE, ISOLA, JEAN HOOD, KIMBA, MABEL TAYLOR, MAKEUP, MALVERN GOLD, MELVA FELL, MORTLAKE, RED RADIANCE, RUBRA, SCARLET QUEEN, SHIRLEY WYNESS, TANGERINE, TELOPEA, VERA WEST, WALTER J. SMITH, WARATAH, WARFLAME and ZOE.

Nearly all of these are quite vigorous under our conditions. Unfortunately, many of them are not very distinctive, and are hardly the good quality flower we have been led to expect from the major hybridizers.

The most outstanding flowers are MORTLAKE and FAHAN.

For color, MABEL TAYLOR and BINKIE (Fig. 14) are fine; and the first named may be the best pink for our conditions.

Good garden flowers are WARATAH, RED RADIANCE, and VERA WEST.

Worthwhile trying are FIDELIS, JEAN HOOD, MALVERN GOLD, RUBRA and SHIRLEY WYNESS. The others are superseded but because of their vigor, they provide good garden value if obtainable at a reasonable price.

J. LIONEL RICHARDSON. J. Lionel Richardson of the Irish Free State has been responsible for some of the greatest "name" daffodils exhibited in recent years. However, garden value and exhibition

value are two different things. Of his introductions I have grown: ALEXANDRIA, BALLYFERIS, BEIRUT, BIZERTA, BLARNEY, BUNCRANA, CASTLEDERMOT, CLEENA, COTOPAXI, FERMOY, FIREMASTER, FLAMENCO, GALWAY, GREEN ISLAND, HARRIER, HONG KONG, JERPOINT, KINGSCOURT, KRAKATOA, LIMERICK, MEXICO, MONACO, NANKING, PEIPING, ROSE OF TRALEE, ROYAL MAIL, ROYAL RANSOM, SEBASTAPOL, SUDAN, TUSKAR LIGHT.

Oustanding is GALWAY, one of the best of all daffodils.

Vigorous or otherwise fine are BUNCRANA, FLAMENCO, MEXICO, ROYAL MAIL and SUDAN; and CASTLEDERMOT and MONACO look promising. Others have been definitely disappointing, among them highly commended varieties like CLEENA, GREEN ISLAND, KRAKATOA, KINGSCOURT, ROYAL RANSOM, and ROSE OF TRALEE. Also some of them seem most unhappy under our conditions, and I have lost BALLYFERIS, FERMOY, LIMERICK and most of TUSKAR LIGHT.

GUY L. WILSON. Guy L. Wilson of Northern Island, has introduced many fine varieties, and I have grown: ARMADA, BANN, BREAD & CHEESE, BRANIEL, CANTABILE, CANTATRICE, CARNLOUGH, CARNMONEY, CHUNGKING, CLONARD, CLONTARF, CORRYMEELA, DREAMLIGHT, EVENING, GARRON, GOLDEN MELODY, GREENLAND, GREY LADY, GUARDIAN, HOME FIRES, INDIAN SUMMER, JACK SPRATT, KANCHENJUNGA, KIBO, KLINGO, KWANNON, LISBREEN, MARAVAL, MAY MOLONEY, MOONGOLD, MOONSTRUCK, MYSTIC, PINKEEN, PREAMBLE, PROMPTITUDE, QUIP, ROUGE, ST. BRIDE, SAMITE, SHANACH, SHINING WATERS, SHIPMATE, SILVER WEDDING, SUN DANCE, SUNKIST, SYLVIA O'NEILL, TIBET, TRUTH, ULSTER PRINCE.

Outstanding are ARMADA, MOONSTRUCK, and HOME FIRES.

Vigorous and fine garden flowers are BREAD & CHEESE, BRANIEL, GARRON, GOLDEN MELODY, and MARAVAL.

Very distinctive, but less vigorous are INDIAN SUMMER, KIBO, LISBREEN, CHUNGKING, and ROUGE.

I would not want to be without the rough but tall TIBET, and the short-lived but beautiful TRUTH. SUN DANCE with its suggestion of red on the trumpet flange is another fine flower even though it is weaker than many of the trumpets. The others so far are either less satisfactory or less distinctive. Their quality is generally very high, but many are late blooming flowers which generally are poor doers in this region.

KRILLIUM AND HEMEROCALLIS CULTURE

GEORGE GILMER, *Virginia*

My garden is heavy clay. Where I set some of my finest plants in 1952, I removed 10 inches of top soil and pulverized the next 10 inches and worked in krillium. Then I returned the top 10 inches pulverizing

it as it was replaced, and then worked krillium into this 10 inches. This gave me soil of the finest texture 20 inches down. *Hemerocallis* planted in it showed unusually large root growth, and considerably deeper rooting.

I thought that I noticed also more top growth. With such roots I feel sure the tops will be larger and better, and that dry spells should not halt the growth.

Krillium is too expensive to be used extensively. It keeps the soil around potted plants in excellent condition at small cost. Before any application the soil must be fairly dry and pulverized. The krillium must be well worked into the powdered soil. If the soil is wet or coarse the krillium cakes and does little good.

VEGETATIVE PROPAGATION OF HAEMANTHUS

The following references concerning the vegetative propagation of *Haemanthus* were brought to the attention of the editor by Dr. V. T. Stoutemyer.

(a) Wildeman, E. de. Bourgeous adventifs *Haemanthus*. Bull. de l'Acad. Roy. de Belg. Classe Sci. Ser. 5. *21:* 590—591. 1935. In the case of a sterile hybrid Wildman observed budding at the summit of the floral stalk, and also at the base of the stalk after flowering.

(b) Pynaert, L. Le bourgeonnement adventif des *Haemanthus*. Bull. Agric. Congo Belg. *27(2):* 255—269. 1936. Using 3—4 cm. long cuttings of the petiole, and leaf blade portions, of a sterile *Haemanthus* hybrid, Pynaert placed these in spaghum moss in July and obtained sprouting within 5 months.

LYCORIS FOR ENJOYMENT

Wyndham Hayward, *Florida*

The Gulf coast area, possibly of similar climatic conditions to those found in South Central China and the lower China coast, including lower Japan and Island of Formosa, has proved to be a hospitable host to the various species of *Lycoris,* especially those preferring warm climate regions.

In the range from lower Texas to Florida around the Gulf of Mexico and extending a few hundred miles into the interior may be found the great majority of *Lycoris* bulbs now grown in the United

States, with the exception of the hardy species, *Lycoris squamigera* and *Lycoris incarnata*.

Lycoris squamigera and *Lycoris incarnata* are hardy into the New England states, and also thrive from Nebraska to Ohio and New York state. The species *L. squamigera*, with its wider leaves, seems less at home in the South, although occasional reports have reached the writer of good results in upper Louisiana, Tennessee and the Carolinas.

Lycoris aurea is entirely at home in the Gulf coast area, but is limited to the warmer regions. It may be found growing with success into Tennessee, Louisiana and the Carolinas in protected locations.

Lycoris radiata, which masqueraded for many years as *Nerine sarniensis* in Southern Gardens until exposed a dozen years ago by the investigations of members of the American Plant Life Society, is thoroughly happy in the lower South, too, especially in heavier type soils. It seems only partly satisfactory in the sandy soils of peninsular Florida although it thrives in North Florida and Georgia where the soils are heavier.

Lycoris aurea is known as the HURRICANE LILY around St. Augustine, Fla., where it is most abundant of any location yet observed. Other plantings may be found on old plantations in Louisiana, Southern Mississippi and West Florida. It thrives down into Central Florida, but sometimes fails to bloom regularly every year. The aristocratic beauty of its fairy-like, sparkling, gold-dusted blooms makes it well worth waiting for, however. Nature has few such glorious rewards for the garden lover as the bloom of a well grown bulb of *L. aurea*.

L. radiata thrives almost to the point of becoming a weed in some old gardens in the lower South. In Southern Alabama, Mississippi and Louisiana, it exists in large colonies to the total number of doubtless millions of bulbs. It too, does not always bloom regularly every year, but the bulbs are so abundant and multiply so rapidly that this is no great problem and there is always a yard full of this *Lycoris* in late Summer and Fall where they are commonly found.

The rarer species of *Lycoris* are also found occasionally in the gardens of fanciers, in the lower South, in central and south Texas, and in southern California. These include *Lycoris sprengeri*, *L. incarnata*, *L. alba* and *L. straminea* Lindl. (?) (see Plate 8 Herbertia 1952) about the identity of which there exists some confusion.

Traub and Moldenke monographed the genus *Lycoris* in AMARYLLIDACEAE: TRIBE AMARYLLEAE, published by the AMERICAN PLANT LIFE SOCIETY, 1949, pages 165-182. They recognize eleven species, with several varieties. Some of these are unknown to cultivation, and because of the success of the *Lycoris* in American gardens of the South, every possible effort should be made to have them introduced by plant explorers as soon as conditions in South China permit.

Species No. 1, as listed by Traub & Moldenke, is *L. argentea*, described by Arthington Worsley from upper Burma, from bulbs sent to Kew Gardens by a Mr. Clapham Jukes, in 1904. So far as known this is not available in the United States. The color is described as bluish

mauve, with a silvery sheen and sparkle, and a mauve keel. The flower resembles a small *L. squamigera*, according to Worsley's description.

Species 2 of Traub & Moldenke's monograph is the rare *L. sprengeri*, which Charles Sprenger reported in 1906 was sent to him from Hupeh, China by his collector about 1900. Sprenger cites the coloring as quite amazingly polychromatic in character, rosy pink, vivid rose in the throat, "otherwise purple and carmine with Prussian Blue petals." This species has been reported from California gardens, so is at least in limited cultivation here.

Lycoris incarnata, a lovely light-rose or flesh-colored species from Hupeh Province in Central China, was also first described by Sprenger at Naples. It is available in limited supply in the American trade and was imported by the writer from China in 1948. It has been reported as blooming for Louisiana garden lovers, so should be tried in other parts of the South. I received it under the name, "*Lycoris squamigera purpurea.*" It grows well in Florida, producing its rather narrow leaves in fall and winter and blooming with an upturned umbel of light lavender-rose-pink blooms in late summer. It requires good culture, fertile but sandy well drained loam, and expert weeding to thrive and increase. It likes part shade and adequate watering, but will survive a long time under difficult conditions.

Lycoris squamigera is too well known to need discussion here except to say that it is known in horticulture as HARDY AMARYLLIS, and AMARYLLIS HALLII. It was first described by Maximowicz in 1885 and is a native of Japan and probably China. Apparently two gentlemen named Hall, were responsible for its first introduction into the United States, according to investigations into the literature by Miss Dorothy Manks, Librarian of the Massachusetts Horticultural Society, and reported by Traub & Moldenke. One was a Mr. I. D. Hall of New Bedford, Mass., who is supposed to have obtained bulbs from a sea captain who brought it from the Far East, and the other a Dr. Hall of Bristol, R. I., who first grew it in his garden in Shanghai, China when he was in the American diplomatic service there. Dr. Hall is said to have had it in his garden in China before 1860.

L. squamigera will grow in the South, but in the sub-tropics tends to waste away and seldom or never blooms. It seems to want a colder climate than Central Florida. It does famously in well-drained gritty garden loam in sheltered positions in the North, but sometimes skips a year's blooming due to weather conditions.

The remaining species of *Lycoris* in the monograph which we have not previously mentioned are *L. sanguinea*, the variety *alba* of same, the variety *cyrtanthiflora* of same, *Lycoris koreana*, *Lycoris rosea*, and *L. straminea*. These are not known in cultivation in the United States, so far as the writer is aware, excepting possibly the last named as already indicated.

Two varieties of *L. radiata* are mentioned, var. *Terracciana*, and var. *pumila*, a dwarf form, which are listed in Col. R. H. Grey's Hardy Bulbs, Vol. 2, but otherwise little known in recent literature. *Lycoris*

rosea may be a natural hybrid, Traub & Moldenke report. It is a species which bloomed at Kew in 1895, but like so many other good things has never arrived in America.

Whether the white forms of *Lycoris* found in this country are *L. sanguinea* var. *alba* or *L. albiflora* is not yet known. The bulbs as they have bloomed for Cecil Houdyshel, well known California bulb specialist, are small in size, but the flowers are handsome and nearly a clear white in color of flower. Dealers have listed these as *L. radiata* var. *alba*. The writer received some bulbs of a species marked "*L. alba*" from China in 1948 which he hopes to bloom next season. They are being nurtured with tender care.

The habitat of *L. sanguinea* var. *alba* is not listed and *L. albiflora* was described by Koidzumi in 1924 as cultivated in Japan and perhaps native to the Island of Amomoshima.

Lycoris straminea is stated to be a straw-colored type of the *L. aurea* order, with range in China. It is not known in cultivation in this country, unless it is the one parading under the name *L. albiflora*, although sent to Kew Gardens by Fortune from China in 1845. It is reported to be highly fertile. The writer has seen seeds of *L. squamigera* obtained from Japan before the World War II. *L. radiata*, at least the type as usually in cultivation in America, is a triploid, cytologically, and does not set seed. Recently Mr. Caldwell has located a source of the fertile strain of Lycoris radiata as reported in this issue of HERBERTIA. A Macon, Ga. horticulturist, W. T. Wood, has reported seed set on *L. aurea* with *L. radiata* pollen. The writer has never seen seed set on *L. aurea* in many hundreds of blossoms over more than a dozen years of growing the bulbs.

Propagation of *Lycoris* is by offsets which are abundant in the case of some species. Other species may be propagated by cuttage, either sectioning the bulbs upward through the base like cutting a pie, and replanting, which will give a slight increase in a year, in sand and peat, or growing the cut quarters and eighths of the bulbs sliced vertically through the base, as in Hybrid *Amaryllis* propagation described in early numbers of HERBERTIA.

If there exists a real opportunity to produce *Lycoris* hybrids, bulb fanciers should turn to this phase of Amaryllid culture without delay. In any case, every effort should be made by horticultural groups to bring in larger stocks of the rarer *Lycoris* species and varieties for trial in favorable climate areas of the country.

Lycoris aurea, perhaps the most lordly and majestic of the genus, was first introduced to England and Western culture by "Dr. Fothergill," as early as 1777, according to the literature. When it and *L. radiata* were brought to the American shores is doubtful, but it must have been more than a hundred years ago, possibly much longer, because of the wide distribution and available stocks now found growing in the Lower South.

Lycoris like a loamy-sandy soil, probably with some lime content, as most of the species seem most at home in such areas. St. Augustine

where *L. aurea* thrives and blooms so freely has a high coquina and coral rock content in its garden soils. West Florida has a limerock content in many areas where *Lycoris* succeed. The presence of clay and other heavy soils may be a factor in the success with *L. radiata* in Georgia, Alabama, Mississippi and Louisiana.

The bulbs stand considerable frost, *L. radiata* being somewhat more hardy than *L. aurea* in this regard. The foliage of these two species as well as *L. incarnata* and *L. squamigera* var. *purpurea* starts in Florida just after blooming time and grows all winter. The leaves die back in late spring and the bulbs are wondrously dormant all through the warm, humid, rainy summers of the Sunshine State with no injury. They evidently have no wish to be "dried off" like the Nerines. The blooming period for all *Lycoris* comes after their dormant stage, and the leaves begin to grow simultaneously, or after flowering.

In Florida sandy loams the *L. aurea* bulbs grow to large sizes, nearly or quite three inches in diameter sometimes, at best, with long necks. They pull themselves deeply into the light soils. In Louisiana, they form a clump in a few years practically at the top of the heavy clay type soils, virtually forcing themselves out of the ground in a few years, according to Miss Camilla Bradley of New Orleans, well known horticultural authority who has grown the bulbs in her country garden for some years. They do not make as large a bulb there but bloom well, she reports.

The rate of natural increase from offsets is not as fast in the case of *L. aurea* as in *L. radiata*. The bulbs of *L. aurea* are scarce and will remain costly to garden lovers for many years, unless new supplies are soon forthcoming from the Far East. *L. aurea* is one of the great classics of all bulbs, having been described by such great botanists as the Chevalier de Lamarck, Dean Herbert, Jaquin, painted by Josephine's eminent court floral artist, P. J. Redoute, "Liliacées" (plate 61, Vol. 2,), and Mrs. Bury included it in full color in her remarkable volume on Hexandrian Plants, in 1836 in England.

HYMENOCALLIS LONGIPETALA AND H. FESTALIS

Len Woelfle, *Ohio*

A few years ago in one of our more popular garden periodicals, a rather prominent writer suggested that after growing *Hymenocallis longipetala* (Lindl.) Maebr. he had about decided to relegate the same to the junk heap because he was disappointed with the small bloom and yellowish coloration of the flower. Surely if he had bothered to examine the bloom more closely he could not have written so harshly about such

a lovely plant. But then he may be one of those horticulturists who can appreciate only size of blooms overwhelmingly large, which dominate the scene by their sheer immenseness.

Hymenocallis longipetala develops one or two scapes of bloom to 30″ tall, five to eight blooms per scape on short pedicels. The declinate cup is about 2″ deep by 1″ wide, somewhat oval at the mouth. Lobes are about ¾″ long, much fringed and rolled backward against the outside of the cup. Petals are pure white about 4″ long, quite narrow, but very gracefully curved, giving the individual bloom a rather odd, tremulous appearance. The filaments are free beyond the cup for about 2″, white, and are exceeded about 1″ by the curved white style. The umbel opens radially over a period of about a week, in the garden. Foliage is rich green, leaves about 24″ long by 2″ wide. It may be grown in pots, or planted in the garden in spring and dug and stored dry over winter like the other members of the ISMENE section of the genus *Hymenocallis*.

Hymenocallis longipetala having short pedicels would allow the individual bloom to be cut for miniature arrangements. I wonder if anyone has ever tried the bloom for corsage work. The ivory coloring of the cup and petals soon changes to pure white after opening. It is the pollen parent of a fine white hybrid form, namely FESTALIS, with its delightful fragrance and waxy-white coloration.

This hybrid, a cross between *Hymenocallis narcissiflora* (syn.-*I. calathina*), and *Hymenocallis longipetala*, is just about intermediate between the two parents in appearance, but seems to have inherited the best characteristics of both.

The plant develops one or two scapes of bloom, taller than either parent, with five to eight blooms per scape. Individual blooms have short pedicels like *Hymenocallis longipetala*, making it adaptable for single bloom use. The pure white cup is about two inches deep and nearly as wide, (intermediate between the parents), the lobes of which are fringed and strongly recurved or rolled back against the cup. Petals are pure white, linear, to 4″ long and gracefully curved like the *H. longipetala* parent. Filaments again, are like those of *H. longipetala*, erect and free about 1½″, exceeded by the long white style about 2″. Foliage is a rich green, about 24″ long, by 3″ wide, (again intermediate). The blooms of the hybrid also open radially like the *H. longipetala* parent, rather than all in one direction like *Hymenocallis narcissiflora*. I would really consider *xHymenocallis* FESTALIS one of our finest white flowers. FESTALIS is not as readily obtainable as some of the other hybrids in this group, but a number of growers offer it. *Hymenocallis longipetala* seems to be rather scarce and I know of only one source of supply for this bulb.

After a number of years of growing these two plants and many attempts to obtain seed I am sorry to report I have been unable to get either to set seed, by their own or other pollens. However, the pollen of both seems viable and I have had a number of successful crosses on other varieties with them. It may be that I have been unable to determine the fertility period of these two varieties. Further experimentation along these lines may turn up something worth-while.

VIABILITY OF SEEDS OF WHITE-FLOWERING AMARYLLIS STRAINS

HAMILTON P. TRAUB, *California*

On July 11, Mr. Wyndham Hayward, of Lakemount Gardens, Winter Park, Florida, sent to the writer a packet containing 28 fresh seeds of hybrid *Amaryllis* of the Ludwig pure white-flowering strain for use in a germination experiment. The seeds had been recently received from the grower and were in the original cellophane cover as packaged by Ludwig in Holland.

The seeds were planted on July 16. The procedure was as follows: Krillium was added to dry clayey garden loam according to the directions of the manufacturer. To one part of this mixture equal parts of medium coarse sand and carex black peat were added. A 5-inch pot was filled ¾ from the top with this final mixture, and about a half inch depth of medium coarse sand was placed on top it. The soil with sand on top was carefully watered and the seeds were planted evenly over the available area. *Amaryllis* seeds are usually described as discoid, but the shape is usually more nearly D-shaped. Evenly spaced depressions were made with the pointed end of a pot label and the seeds were placed in these with the flattish edge downward, and with a small part of the upper rounded edge protruding from the medium coarse sand. A piece of narrow mesh window screen wire a little larger than the area was then firmed down over the seeds so as to come into contact with the sand. This is necessary to prevent loosening of the seeds during regular watering. As soon as the seeds begin to sprout the wire screen is raised sufficiently so that the sprouting leaves do not touch it. After the seedlings are well established, the wire screen is removed.

In 14 days after planting (July 16), the seeds began to sprout, and 8 seedlings had appeared above the surface by August 8. This was increased to 21 seedlings by August 15, and a final total of 23 seedlings by August 23. Thus an approximate total of 82% of the seeds germinated. The seedlings were fertilized at fortnightly intervals with a sprinkling of Vigoro which was immediately washed down after application. The seedlings grew rapidly and all survived.

Many *Amaryllis* enthusiasts have reported failures with *Amaryllis* seeds of pure white-flowering strains. Such seeds apparently soon lose their viability after harvesting. Seeds of the colored strains appear to hold their viability somewhat longer, but it is advisable to plant all *Amaryllis* seeds as soon as possible after harvesting when produced in humid regions. Hermon Brown (HERBERTIA 1952, page 112), in the central valley of California reports that seeds harvested in May—July gave good germination when planted in the following January. This apparently might not apply to seeds produced and stored in humid

regions, unless the seeds were stored under the required conditions of atmospheric temperature and humidity. What these conditions might be could only be determined by experimentation.

POT CULTURE OF AMARYLLIS BELLADONNA L.

HAMILTON P. TRAUB, *California*

Although the brilliant scarlet-flowering *Amaryllis belladonna* L. var. *major* is naturalized in Florida, this fine subject has not been cultivated indoors in pots to any great extent in the North. This is due to the fact it requires very good soil drainage. The root system under pot culture is not very extensive and unless special precautions are taken, the soil becomes sour (pH too low), and the roots become reddish and die off so that finally the rootless bulb showing red-rot and reduced leaf top (also red-streaked) can be lifted out.

The writer has carried on cultural experiments with this subject over several years and has had satisfactory results with the following pot culture method. A half to one inch layer of crock chips or gravel is placed on the bottom of the pot, and it is filled 2/3 from the bottom with coarse sand. The bulb is placed on top of the sand if rootless, but if roots are present these are worked into the sand so that the base of the bulb is on top of the sand. A soil mixture of 1/3 loam, 1/3 coarse sand and 1/3 black carex peat is placed around the bulb to within an inch of the top. The plants are fertilized regularly with Vigoro, or other suitable fertilizer. The plant is evergreen, but it is best to reduce the water applied and omit fertilizer from November to February.

Bulbs of *Amaryllis belladonna* L. var. *major* potted and treated in this way have now been grown for three years and have made excellent root growth and have flowered regularly each year, and show no root diseases such as red-coloration and die back.

It is hoped that bulb dealers will now include *Amaryllis belladonna* L. var. *major* among their offerings and thus make this fine subject available to all since a steady supply of bulbs can be obtained by arrangement with Florida growers.

The writer has five varieties of *Amaryllis belladonna* L., in addition to the type. It is noteworthy that two of these will thrive under ordinary pot culture. Some of these forms are described in Traub & Moldenke's *Amaryllidaceae:* Tribe *Amarylleae*. 1949 (Publ. by The American Plant Life Society, 26 E. Camino Real, Arcadia, Calif.):

1a. Varieties requiring special pot culture as outlined above:
Amaryllis belladonna L. var. *major* (2-fld, Scarlet; West Indies)

Amaryllis belladonna L. var. *minor* (2-fld., scarlet; West Indies)
Amaryllis belladonna L. var. *sebaiana* (3—4-fld., scarlet; West Indies)
Amaryllis belladonna L. var. *barbata* (2-fld.; creamy white; Surinam)

1b. Varieties not requiring special pot culture:

2a. A variety that makes fair growth without special treatment, but which responds with better growth if the special pot culture is used:

Amaryllis belladonna L. var. *haywardii* (2—3-fld.; carmine pink; Bolivia)

2b. The type which produces extensive roots and never requires special pot culture:

Amaryllis belladonna L. (type), Barbados Lily (2—3-fld., scarlet; West Indies). The extensive root system keeps the soil sweet, but the roots and offsets soon fill the pot, and the bulbs rarely if ever flower under pot culture. Recommended for out-door culture in sub-tropical climates.

All of the forms listed make offsets profusely, except *Amaryllis belladonna* L. var. *haywardii* which makes only a moderate number. When profusely produced, the offsets should be removed every six-months or oftener if required in order to keep the parent bulbs (3 to a 6″ pot) in good condition.

It is of interest to note that the special pot culture method has also been used for some other amaryllids difficult to handle. More detailed reports on these will be made in the future. The use of Krillium and similar soil conditioners may make it un-necessary to resort to special pot culture methods but such recommendations will have to be based on experimental data.

AMARYLLIS BELLADONNA LINN. IN FLORIDA

C. L. Burlingham, *Florida*

My beginning with the American Belladonna, *Amaryllis belladonna* Linn. is rather amusing to me now. I ordered six Amazon Lilies from a lady in Georgia. I know now that I received three bulbs of *Amaryllis belladonna* Linn., two of *xAmaryllis johnsonii*, and another bulb I have never identified. I planted them April 29, 1948, three to a row, in a raised bed of sandy soil. The bulb I never identified, I planted too close to the edge of the bed, where it did not get enough water during the dry

[Burlingham—AMARYLLIS BELLADONNA, continued on page 152.]

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PREFACE

The AGAVE FAMILY *(Agavaceae)* includes species that are important from the standpoint of industry: BOMBAY FIBER *(Agave vivipara* L.), BOWSTRING HEMP *(Sanseviera zeylanica* Willd.), DRAGON'S BLOOD (resin from *Dracaena cinnabari* Balf. f.), DRAGON TREE of Canary Islands *(Dracaena draco* L.), HENNEQUIN *(Agave fourcroydes* Lem.), MEXICAN FIBER *(Agave heteracantha* Zucc.), KERATTO FIBER *(Agave morrisii* Baker), MAURITIUS HEMP *(Furcraea gigantea* Vent.), NEW ZEALAND HEMP *(Phormium tenax* L. f.), and SISAL HEMP *(Agave sisalana* Perr.). The AGAVE FAMILY also includes many species of great importance as ornamentals useful in landscape design, and as garden, window, conservatory and patio subjects. Unfortunately, the popular information about these plants is quite limited, and it was to make good the deficiency that in 1952, an AGAVACEAE COMMITTEE was organized with Mrs. Morris Clint as Chairman.

In the present FIRST AGAVACEAE EDITION of PLANT LIFE an attempt has been made to present articles on *Agavaceae* of interest chiefly as garden, window, conservatory, and patio subjects, and also one species of value in landscape design. This issue includes articles on *Dracaena* and *Cordyline,* the tribes and genera of the AGAVE FAMILY *(Agavaceae), Beaucarnea recurvata,* and *Polianthes tuberosa.* The AGAVACEAE COMMITTEE plans to continue this start with additional articles in future issues of PLANT LIFE.

The present issue also includes book reviews (PLANT LIFE LIBRARY), description of the Society publications, a listing of plants receiving APLS awards in 1952, and seeds and plants directory. At the end of the issue will be found a complete table of contents to Plant Life, Vol. 9. 1953 to be used in binding the volume.

1531 Rodeo Road,
Arcadia, California,
January 5, 1953

Harold N. Moldenke
Hamilton P. Traub

CORRIGENDA

PLANT LIFE, VOL. 9, 1953

Page 83, division "1b" in key, first line, delete "basifixed". Study of living material for a number of species in the Subgenus COOPERIA has shown that the stamens were not basifixed.

HERBERTIA, VOL. 12. 1947

Page 60, 23rd line from top, change "probably in Argentina and Chile" to read "in Texas, near New Braunfels.".

HERBERTIA, VOL. 15 (1948) 1949

Page 78, 2nd paragraph; delete that portion which states that "Bot. Reg. pl. 382. 1819" represents *Haemanthus clarkei* Hort. It should be noted that the illustration "Bot. Reg. pl. 382. 1819" represents *Haemanthus pubescens* Ker-Gawl., non L. f., now considered as a synonym of *Haemanthus albiflos* Jacq., and is not a hybrid as indicated by the writer in HERBERTIA 15: 78. 1948, through an error.—*L. S. Hannibal*

DRACAENA AND CORDYLINE IN THE LOWER RIO GRANDE VALLEY

Mrs. Morris Clint, *Texas*

Of the many beautiful tropical foliage plants that are grown today, few can rival *Dracaena* and *Cordyline* in beauty, ease of cultivation and variety of use. Though both are popularly known and usually sold under the name *Dracaena*, the two genera come from the opposite sides of the world; *Cordyline* being found in Australia, New Zealand, East Indies, Malaya and the South Sea Islands, while most of the *Dracaena* species are native to tropical Africa. The two groups are very close horticulturally, differing technically in size and character of flower and fruit, but even an amateur can easily learn to tell the two apart by the general appearance of the plant. The leaves of *Dracaena* are softer and more succulent, and variegation, when present, is more regular and persistent. In *Cordyline*, with few exceptions, the leaves are narrowed into a definite, deeply channeled petiole and are arranged on the stem in an ascending spiral. Variegation is not usually constant, but appears in flushes and streaks and varies with the season and the age of the leaves. As a rule, the young center leaves have the most brilliant hues, the color reaching a peak during the fall and winter. However, here in the Valley, well cared for plants are well colored all or most of the year.

CORDYLINE [FIG. 19; PLATE 11, LOWER; PLATE 12]

The genus *Cordyline* is rapidly gaining in popularity over the country, due apparently to the increased use of the beautiful leaves in flower arrangements. Hawaii seems to have been the center or impetus of this recent "boom". Several years ago, growers there began shipping large boxes of "colored leaves" to the florists on the American mainland. As they filled a very decided need, they were welcomed with open arms. It soon became known that the leaves were from the "Ti" plant, as *Cordyline* is called in Hawaii; so a new name and a new rage were born overnight. Word of the Hawaiian "Ti" must have spread through the garden clubs, as so many of our recent, out of town visitors invariably ask to see the "Ti" plant, desiring to know the correct name, where plants may be obtained and how to care for them. Gardeners in Hawaii and the warmer parts of this country have long been aware of these beautiful plants and their extreme usefulness, and they deserve to become better known over the rest of the country. In Brownsville, we use both *Cordyline* and *Dracaena* in the garden for landscape effect, and in pots and tubs for porch and patio. With the increased use of glass in modern building, gardeners in the colder sections should have no difficulty in caring for these lovely tropicals.

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Most of the Cordylines seen today are hybrids originating from a few species, the highly colored *C. terminalis* [Fig. 19] being the most widely used. Many of these hybrids have been named, but nomenclature is in such hopeless confusion that I do not feel qualified to attempt any descriptions. We find the same plant masquerading under several names and we may buy different plants under the same name. However, all are very beautiful, with colors ranging through various shades of purple, rust, bronze, green, red, crimson, pink and white, and combinations of these.

Fig. 18. *Left, Dracaena* hybrid *(xDracaena masseffiana)* in 8-inch pot; *right, Dracaena rothiana* (?); (in background, on tree is unidentified *Monstera* sp. from Mexico. Photos by Mrs. Morris Clint.

DRACAENA [FIG. 18; PLATE 11, UPPER]

Nomenclature of *Dracaena* seems more stabilized in the trade, and horticultural forms as well as species are usually dependably listed. In only one instance have we received a plant that we feel may be incorrectly classified. The plant in question is *D. rothiana,* supposedly a variety of *D. fragrans.* Our plant is entirely unlike *D. fragrans* and seems to more closely fit the description of *D. hookeriana.* It is a very slow growing but most satisfactory plant, having very heavy, dull green, arching leaves with a fine, white pellucid border. *D. fragrans,* with plain, arching leaves of shining green, and its varieties are desirable and lovely plants. *D.* Janet Craig *(craigii)* is similar to the species, but has darker green, slightly ridged leaves. This is a fast grower with us, our two and a half year old plant now being almost five feet tall. *D. massangeana* is perhaps the best known of this group. It has a broad central stripe of yellow, while *D. lindeniana* is the reverse, with leaves of yellowish green and central band of darker green. *D. victoriae* is

truly a gorgeous plant, having cream white leaves with center of deep green, but is rather a difficult subject, requiring perfect care and growing conditions. Growth is slow with us, and we experience difficulty in the summer in preventing the creamy portion of the leaves from burning. One would hardly recognize the species *D. godseffiana* as a *Dracaena*. It is quite shrubby in character, with small leathery leaves of deep green, heavily spotted with yellow, which turns cream white upon aging. There is also a variety of this having a heavier variegation, but we find it so slow in growth that it is hardly worth while. A very lovely hybrid between *D. godseffiana* and *D. massangeana*, called *D. massefiana*, is a

Fig. 19. *Cordyline terminalis* (var. Ti) in flower; plant 4½ feet tall (12-13-52) 2 years growth since the last freeze. Photo by Mrs. Morris Clint.

strange mixture of the two species. It is semi-shrubby, with medium sized, drooping leaves, lightly spotted yellow. *D. deremensis* var. *warneckii is* a slightly smaller plant than *D. fragrans* and its varieties. It has narrower, arching leaves banded longitudinally with green, gray and white. *D. longii* is possibly a sport of this, having bands of pure white and dark green. It is a very striking plant, but we have much the same trouble as in *D. victoriae* during the hot months. *D. marginata*, sometimes called *D. gracilis*, is a very graceful species with long, narrow leaves edged with reddish brown. *D. sanderiana* is a tall, slender plant with small, narrow, wavy leaves of green and white set far apart on the stem. It is useful when small for dish gardens, but potted specimens must be cut back at intervals to prevent them from becoming too tall

and leggy. This species of *Dracaena* seems to stand more sun than most. *D. virens* is a plain green form of this. Distinctly different from any of the above and the most beautiful of all, is *D. goldieana*. Leaves are broad and spreading, narrowed into a deeply channeled petiole, and are horizontally barred with irregular bands of gray. Unfortunately, this species is very rare and hard to obtain, as it is both delicate and slow. Our plant of *D. goldieana* was severely damaged in the 1951 freeze, losing most of the leaves and the entire root system when temperatures in the greenhouse skidded to a few degrees above freezing. We were fortunate enough to root the tip cutting, which has since made a truly remarkable recovery.

CULTURE

Culture of *Dracaena* and *Cordyline* is similar, though *Cordyline* will stand considerably more abuse. Both are tender tropicals, but *Dracaena*, whose leaves are more succulent, will often spot and burn long before temperatures reach freezing. However, in our garden, well established plants of both genera survived a week-long freeze, with a minimum temperature of 19 degrees. True, the tops were killed to the ground, but most of the plants had completely recovered and had reached their former height within a year. More care is necessary with plants in pots and tubs, of course. In the same freeze, we lost many fine species and hybrids of *Cordyline* in our open patio, and one unidentified species of *Dracaena* we have so far been unable to replace.

We have not found any of these plants particularly fussy as to soil, but they do respond to moderately rich, well balanced soil mixtures and regular fertilization. Moisture requirements, particularly during the warmer months, are a little above the average, but good drainage is essential. It is especially necessary for plants in containers to be provided with adequate supplies of food and water, so as to prevent loss of the lower leaves and to preserve their beautiful color. We have had *D. lindeniana* revert completely, due entirely to lack of fertilizer. This is of course true of many variegated foliage plants, and is particularly hard to cope with where there is high alkalinity of soil and water, as in our case.

Our specimens in the garden endured a grueling experience this spring, when an acute water shortage hit this area, due to a record drought over the entire water-shed of the Rio Grande River. For about two months, our plants received not one drop of water. They came through the ordeal very much the worse for wear when in too much light, but held up fairly well when in the proper amount of shade. To grow them to the degree of perfection they deserve, give as much light as the plants can stand without burning, choosing a spot that is sheltered from strong winds. Insects and pests give very little trouble on healthy plants, except when very young. Our chief problem has been a fungus which attacks the edges of the leaves. Fermate will give complete control, if used with a good spreader at intervals of ten days. Unfortunately, with us the ten days rolls around too often.

(Upper) Bench in greenhouse showing Dracaenas and so-called Aralias. (In background, left to right): **Dracaena rothiana** (?); **D. marginata; D. lindeniana;** (Foreground, left to right): **D. sanderiana; D. godseffiana; D. longii, D. virens, D. warneckii,** (Lower right hand corner): **D. goldieana.**

(Lower), Cordyline terminalis (var. Ti). Windows in picture are very high from ground.

Photos by Mrs. Morris Clint.

Plate 11

(Upper left) Unidentified **Cordyline** sp., leaves dark purple, in 8-inch pot. (Upper right) In background, very robust plain green **Cordyline** sp.; right foreground, **Cordyline** hybrid, dwarf form; left, unidentified **Maranta** sp. from Mexico, dark green, lots of white flowers in summer.

(Lower left) **Cordyline** sp.; **Polyscias balfouriana** and **Castus igneus** in background.

(Lower right) **Cordyline** sp.; poinsettia; **Cadiaeum** sp., (more commonly, **Croton**); **Pandanus sanderi**; **Jasminum rigidum** (?); **Crinum** sp. in foreground, interplanted with hybrid **Amaryllis.**

Plate 12

PROPAGATION

Propagation of both *Dracaena* and *Cordyline* may be accomplished by rooting the tender tip shoots, air-layering, or by cuttings of the canes. Thus, when a plant has outgrown its beauty and has a length of bare stem, you may air-layer the top, using a match or something similar to keep the wound well open till roots have formed in the moss; then cut the stem into pieces from two to six inches long. Weather should be warm enough for good general growing conditions. We have found March and April to be the best time here, as our spring is early and all too short.

Several years ago, we successfully rooted in open flats of sand and peat in equal portions, canes of *D. fragrans*, *D. massangeana*, *C. terminalis*, *C.* Firebrand and *C.* Mrs. Eugene Andre. Our percentage of loss was not heavy, but we were not entirely satisfied; so when, on March 2 of this year, we received a number of canes of *C.* Rufus Scott, *C.* Lord Wolesey, *C. tricolor* and *C.* Janet Craig, Mr. Clint decided to experiment, using different methods and rooting mediums. Into a glass covered propagating frame, one section containing Sponge-Rok, the other a 50-50 mixture of Sponge-Rok and German peat, he placed 4″ to 5″ pieces of stem, lower half treated with a rooting hormone. Cuttings were inserted upright about halfway in the mediums. In two seed flats, one containing equal portions of Sponge-Rok and peat, and the other a mixture of vermiculite, sand and a sprinkling of peat, 2″ cuttings were laid flat, just being covered with the mediums. Over the Sponge-Rok and peat went a mulch of red-wood fibre, over the vermiculite damp sphagnum was used. Both were covered with glass. One cutting, 5″ long, of each variety was suspended in distilled water and placed in the greenhouse, another set was planted in the ground and mulched with red-wood fibre. Sprouts appeared from the dormant eyes on most of the cuttings, in all mediums, within a few days. Roots developed on those in the distilled water shortly afterwards, and the shoots on these appeared to grow faster, but those in the Sponge-Rok soon passed them and about 50% of the latter were potted up just a month after planting. Cuttings in the other half of the propagating bed were considerably slower, and the experiments in the two flats were a comparative failure, due to the fact that boxes were kept in too much sun. Rooting was slow and uncertain and the little shoots burned badly as they grew up through the mulching material. In an attempt to keep the sphagnum damp and prevent this, most of the cuttings in the vermiculite were lost due to over-watering.

To sum up the results: Sponge-Rok seems to be the best rooting medium, with quickest results and less loss; cuttings of about 4″ are the best length, giving good, strong shoots; care should be taken to keep cuttings damp but not wet; loss after potting is liable to occur if shoots are insufficiently developed when cuttings are potted, or if soil in pots is over dry or too wet. As roots form only at the base of the old stem,

[Clint—DRACAENA AND CORDYLINE, continued on page 152.]

THE TRIBES AND GENERA OF THE AGAVACEAE

HAMILTON P. TRAUB, *California*

During 1952 an AGAVACEAE COMMITTEE was formed with Mrs. Morris Clint as Chairman, and therefore it is desirable to publish an outline of the field to be covered by this Committee. The key to the tribes and genera of the *Agavaceae* to be presented in this paper has been based mainly on the excellent text in Hutchinson's Families of Flowering Plants (Vol. 2. 1934) which the reader should consult for the study of the relationship of the *Agavaceae* to the other families of the MONOCOTYLEDONS. The enlarged key to the genera *Nolina*, *Calibanus* and *Beaucarnea* of the Tribe *Nolineae* has been taken from Standley (1920). The new Tribe *Hosteae* is proposed for the first time.

Hutchinson (1934) presented a new classification of the MONOCOTYLEDONS in which the new Family *Agavaceae* was proposed "as a half-way house between the Liliaceous stock and the climax group of the *Palmae*. . . . It may be regarded as a family composed of the most advanced tribes formerly included in the *Liliaceae* and *Amaryllidaceae*, the ovary being either superior or inferior. The rootstock is never bulbous, the habit is usually arborescent, whilst the inflorescence is never umbelliform as in the *Amaryllidaceae (sensu stricto)*." Hutchinson proposed this classification on wholly morphological grounds, but McKelvey and Sax (1933) working independently at about the same time corroborated this arrangement in part on a cytological basis. They showed that *Yucca* and *Agave*, and also *Hesperoyucca*, *Hesperaloe* and *Samuela*, and at least one species of *Furcraea* are apparently related on the basis of the resemblance of their karyotypes. Whitaker (1934), also working independently of Hutchinson (1934), combined the cytological results of previous workers with his own and showed that the five genera in the *Liliaceae (Yucca, Hesperoyucca, Hesperaloe, Cleistoyucca, Samuela)* and four genera in the *Amaryllidaceae (Agave, Furcraea, Polianthes, Beschorneria)* form a distinct unit and as such should be united in any future revision of these two families. Thus the morphological and cytological data provide a firm basis for the new Family *Agavaceae*. Granick (1944) studied the karyotype in 36 species of *Agave*, and thus corroborated and extended the work of previous workers, and on evidence obtained in a study of the karyotypes of various genera of the *Monocotyledons*, a line of ascent was "postulated from the primitive Monocotyledons such as the *Butomales* up through a rhizomatous liliaceous stock like *Hosta*, to the *Agaveae*." This answered the objection of Watkins (1936) that the evidence presented was not extensive enough. Since the unique "*Yucca-Agave* karyotype consists of a pattern of ten large chromosomes on the periphery of the metaphase plate and fifty small ones differing slightly in size grouped in the center," a karyotype

"also found in *Yucca*, *Furcraea* and *Hosta*" (Whitaker, 1934; Granick, 1944), we may consider *Hosta* as allied to the *Yucca-Agave* group. Although the leaves of *Hosta* differ from those of most *Agavaceae* as recognized by Hutchinson (1934), there is similarity between its flowers and those of the Tribe Yuccaeae. Such a difference in vegetative anatomy might be explained on the basis that the species of *Hosta* have evolved in a mesophytic climate.

Hutchinson (1934) grouped the genera *Hemerocallis*, *Hosta*, *Hesperocallis*, and *Leucocrinum* under the tribe *Hemerocalleae*. Cave (1948) has shown that *Hesperocallis* and *Leucocrinum* should be excluded from the tribe *Hemerocalleae*. This tribe had been transferred to the *Amaryllidaceae* by Traub (1938), with confirmation by Traub & Moldenke (1949), on the basis of the chromosome complement, $2n = 22$, of the type genus *Hemerocallis*, and similarity in flower morphology. Thus the residual genus *Hosta*, apparently unrelated to the genus *Hemerocallis* has to be considered as the type of the separate tribe *Hosteae*. This tribe is apparently nearest to the *Agavaceae* as already indicated, and in the present treatment is included as the most primitive tribe of that Family.

No chromosome studies for the Tribe Phormieae are available. Whitaker (1934) and Granick (1944) have pointed out that *Doryanthes*, from the standpoint of karyotype and geographical distribution, does not belong in the *Agaveae*, and that there is no apparent resemblance of the karyotypes of the *Nolineae* and *Dracaeneae* to the *Yucca-Agave* chromosome complex. For the present, however, awaiting further study, these groups are retained in the *Agavaceae* on morphological grounds as proposed by Hutchinson (1934).

The key to the tribes and genera of the revised Family *Agavaceae* follows:

KEY TO THE TRIBES AND GENERA OF THE AGAVACEAE

1a. Ovary superior:
2a. Flowers hermaphrodite; fruit usually capsular:
3a. Anthers not foveolate (pitted) at the insertion of the filaments:

4a. Plant a perennial herb ..... I. Tribe HOSTEAE [1]

Flowers white, lilac or blue, trumpet-shaped or campanulate, in short or open raceme terminating the scape (Siberia, China and Japan) ..... Genus 1. HOSTA

4b. Plants with stem woody, short or tall:

5a. Tepals free or rarely connate ..... II. Tribe YUCCEAE
6a. Tepals connivent into a cylindrical "tube"; flowers large, in a single raceme (Calif.) ..... Genus 2. HESPERALOE

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[1] Tribus **Hosteae** Traub, **tribus nov.** (deser. et typ.—**Hosta Trattinnick,** Archiv. der Gewaechskunde I, pt. 2. p. 14, nr. 89. 1812.). **Genus typicum: Hosta Tratt. (1812).**

6b. Tepals connivent into a globose or campanulate "tube":
7a. Style absent (Calif.; Ariz.) ..... Genus 3. CLISTOYUCCA
7b. Style present; tepals free or united:
8a. Tepals free (N. to Cent. Amer.) ..... Genus 4. YUCCA
8b. Tepals united (Texas, Mex.) Genus 5. SAMUELA (HESPEROYUCCA)

5b. Tepals variously connate ..... III. Tribe DRACAENEAE
9a. Ovules numerous:
10a. Style well developed; tepals united into a short tube (Tropics, except Afr.) ..... Genus 6. CORDYLINE
10b. Style short; tepals united at the base only (Masc. Isl., N. Caled.) ..... Genus 7. COHNIA

9b. Ovules solitary:
11a. Stem present, woody; fruit a berry (Warm regions) ..... Genus 8. DRACAENA
11b. Stem absent or very short, often fibrous; leaves thick and leathery; fruit a thin pericarp falling away from the berry-like seeds (Trop. & S. Afr. & India) ..... Genus 9. SANSEVIERIA

3b. Anthers foveolate (pitted) at the insertion of the filaments ..... IV. Tribe PHORMIEAE
Tepals united in the lower part, fruit a loculicidal capsule (New Zealand) ..... Genus 10. PHORMIUM

2b. Flowers polygamo-dioecious or dioecious in panicles; fruit indehiscent ovules 2 or 3 in each cell ..... V. Tribe NOLINEAE
12a. Ovary 3-celled; fruit exaltate:
13a. Fruit deeply 3-lobate, often inflated (S. W. U. S. & Mex.) ..... Genus 11. NOLINA
13b. Fruit not lobed or inflated (Mex.) ..... Genus 12. CALIBANUS
12b. Ovary 1-celled:
14a. Fruit 3-winged; tepalsegs entire; leaves somewhat ribbed, the margins not prickly (Mex.) ..... Genus 13. BEAUCARNEA
14b. Ovules 3, erect; flowers in dense narrow panicles (N. Amer.) ..... Genus 14. DASYLIRION

1b. Ovary inferior:
15a. Flowers actinomorphic; inflorescence usually paniculate ..... VI. Tribe AGAVEAE
16a. Stamens longer than the perigone; style filiform (Amer.) ..... Genus 15. AGAVE
16b. Stamens shorter than the perigone:
17a. Filaments and style thickened below the middle; panicle very large (Trop. Amer.) ..... Genus 16. FURCRAEA
17b. Filaments and style not thickened:
18a. Anthers dorsifixed; tepalsegs erect (Mex.) ..... Genus 17. BESCHORNERIA
18b. Anthers basifixed; tepalsegs spreading from the base (Austral.) ..... Genus 18. DORYANTHES

15b. Flowers zygomorphic; inflorescence spicate or racemose ..... VII. Tribe POLIANTHEAE
19a. Flowers usually paired:
20a. Tepaltube cylindrical, expanded at the top (Cent. Amer., Mex., Trinidad) ..... Genus 19. POLIANTHES
20b. Tepaltube widened in the middle (Mex.) ..... Genus 20. PROCHNYANTHES
19b. Flowers usually solitary (Mex.) ..... Genus 21. PSEUDOBRAVOA

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NOTES ON BEAUCARNEA RECURVATA

Mulford B. Foster, *Florida*

My introduction to *Beaucarnea recurvata* coincided with my first tour of Florida nurseries in 1924 in the days when this plant was known as *Nolina recurvata*. It was in the garden of the old Royal Palm Nursery at Oneco, Florida. Only by chance was my eye attracted to a rather odd looking plant quite different than any of the familiar tropical plants. Its large tuft of narrow leaves gracefully spilling out of the top of a spindly trunk which emerged from an overstuffed bulbous base intrigued me immensely. Although it was eighteen feet high and I considered it good size at that time, its proportions were dwarfed when I beheld the same species growing in its native habitat eleven years later.

It was in 1935, near the Gulf Coast, in the eastern part of the state of San Luis Potosi, Mexico, on my first plant collecting trip there that I saw a single, lonely mature plant of *Beaucarnea recurvata* growing in its rocky habitat. This was a magnificent giant whose unusual character now fascinated me even more and I could scarcely contain my eagerness in anticipation of seeing more than this one specimen, a wish granted a few days later when, with my artist friend, I crossed the Huasteca mountains on the way to the city of San Luis Potosi. It was impossible to proceed on the new Pan American Highway which was just being completed at that time, on account of a huge landslide that had occurred a hundred miles ahead on the mountainous road to Mexico City.

Crossing the Huasteca was a very rough and arduous trip. One da we were able to make only twenty miles but this slow pace gave me chance to observe more closely than I could have otherwise, the interest ing desert and mountainous vegetation. Also, in this direction w chanced upon a forest, no less, of Beaucarneas growing between and ove the great boulder-strewn sides of a mountain.

Fig. 20. *Beaucarnea recurvata* as grown in Florida. Photo by Mulford B. Foster.

The photos my camera took were lost but the indelible impression and mental picture of this great sight has never left me. There were literally thousands of these fantastic bulbous giants growing where it would seem that nothing else could grow. Whenever I attempt to describe the dimensions of the largest specimens that were observed on this trip, few people believe that a story teller's license has not been liberally taken. But no exaggeration is intended.

The huge bulbous base was twenty-nine feet in circumference at the ground; it gradually sloped into the trunk which rose into a branched tree-like form to thirty feet in height; the trunk was but eighteen inches in diameter six feet from the ground—a fact which emphasized more sharply the unusual bulbous base. My enthusiasm immediately made my imagination transport this magnificent specimen to our garden in Florida—what a prize it would be!

I was determined to climb up into this tree to procure seeds but it was like trying to climb over a huge ball without anything to hang on to. We had to cut down a small tree to use as a ladder for climbing up over the base to the trunk. From there I climbed up to where the lower branches were formed, and then I went on up into the maze of long ribboned leaves. I felt as though I was caught in a series of green fountains for the top and all of the branches were tipped with drooping fountain-like heads that continuously bubbled over with gracefully streaming leaves.

A year later in 1936 I returned to this area again and was able to collect a nice quantity of viable seeds which were planted upon my return to Florida. The plants in their infant stage resemble a tuft of grass growing from a little bulb but in a few years they take on the character of the adult; they are always intriguing at any stage. Some of these seedling plants are now eight or nine feet high but some of them are not more than two feet high . . . even though they are all the same age.

For the home gardener the culture of these plants is certainly very simple. The soil should, naturally, be well drained whether sandy or rocky. They do exceedingly well in a large pot or tub as an ornamental patio plant but as a specimen in the ground for a feature it is nonpareil. They are not adverse to cool weather but do not enjoy a temperature much below freezing.

The fruit which resembles a small cylinder with three flange-like wings tightly enclose a globular hard seed having three rather indistinct lobes. These fruits are borne on a much branched inflorescence two to three feet high which contains hundreds of small whitish flowers. As soon as the fruits are mature they dry on the branches and are shaken loose by the wind and are carried on their three wings to a new landing or sprouting platform.

The Beaucarneas like so many other exceptionally decorative plants that are slow growing will always be a feature in any garden fortunate enough to possess one.

POLIANTHES TUBEROSA

HAMILTON P. TRAUB, *California*

Polianthes tuberosa L., is widely cultivated in the United States. The usual forms met with are the single ones with entirely green leaves or with white or yellowish margined leaves, and the DOUBLE PEARL form. Forms with reddish flowers have been reported but in each case that the writer investigated it was found that the plants produced white flowers. It is of interest to note in this connection that the colored plate by Drapiez (Herb. L'Amat. Fleurs. *4:* pl. 272. 1830) shows a form in which the buds are suffused with red and a little blue. The open flowers are reddish on the back of the tepalsegs. If such a form really exists, it would be highly desirable to search for it again. With a distribution from Mexico, Central America and Trinidad, it would be surprising if color variations would not be found. Species of the related genera *Prochyanthes* and *Pseudobravoa*, also in the Tribe *Polianthcae*, should be brought into cultivation. Possibly bi-generic hybrids could be made in this Tribe.

PLANT LIFE LIBRARY

OUR GARDEN SOILS, by Charles E. Kellogg. The Macmillan Co., New York. 1952. pp. 232. $4.00

At last we have the long awaited concise, easily readable book on soil science by an eminent authority on the subject. He "tells you, in non-technical language, how to determine soil types, how to maintain proper amounts of organic matter and moisture, how to control soil acidity and how to balance plant nutrients. Numerous tables recommend specifically the plants that are best for your soils." Discussions of tillage, site relations, protection, lawns, potting soils, transplanting and garden planning are also included. Every gardener should own a copy of this excellent book.

THE PRINCIPLES OF GENERAL BIOLOGY, by Mary S. Gardiner. The Macmillan Co., New York. 1952. pp. 657. illus. $5.25.

This easily readable and attractive text by an experienced teacher will be welcomed by students as well as adults seeking a liberal education. The first section of the book is devoted largely to the concepts and techniques of physics and chemistry upon which biology is primarily dependent. In the second section the organization of living things is

considered on a comparative basis. It should be noted that at the lower levels of structural organization, and differentiation of cells, plants and animals are discussed together. The third and fourth sections are concerned with the operation and evolution of biological systems. The text is adequately illustrated. It is highly recommended.

INSECT RESISTANCE IN CROP PLANTS, by Reginald H. Painter. The Macmillan Co., New York. 1951. pp. 520. illus. $7.25.

In this first attempt to bring together the scattered information on insect resistance in crop plants, the author has achieved a great measure of success. This book fills a long recognized need. The subjects included concern the mechanisms of resistance, factors that affect the expression or permanence of resistance, resistance to insects in wheat, corn, cotton, sorghums, potato, and methods and problems in breeding for resistance to insects in crop plants. There is also a selected supplementary bibliography. This important and timely book is highly recommended.

GENERAL BIOLOGY, by James Watt Mavor. 4th ed. The Macmillan Co., New York. 1952. pp. 875. illus. $5.75.

This revised 4th edition of a scholarly text has much to recommend it. The scientific method is introduced at the beginning of the book (Part I). Part II is devoted to plant life, Part III, to the invertebrates, Part IV, to vertebrate anatomy and physiology based on the frog and man, Part V, to development and heredity in plants and animals, Part VI, to the organic world and its evolution, and the appendix to a synoptic table of the plant and animal kingdoms, a reference section in chemistry and a glossary of terms. This excellent, easily readable, and aequately illustrated text is very highly recommended.

LABORATORY EXERCISES IN GENERAL BIOLOGY, by James Watt Mavor. 4th ed. The Macmillan Co., New York. 1952. $3.50.

This manual has been designed to accompany the 4th edition of the author's General Biology text with the aim of making possible a close coordination between classroom and laboratory work. Part I is concerned with detailed instructions, and Part II consists of the necessary detachable work sheets.

GENERAL BIOLOGY, by Perry D. Strasbaugh and Bernal R. Weimer. 3rd ed. John Wiley & Sons, New York. 1952. pp. 813. illus. $6.00.

This 3rd edition of a well known text will be enthusiastically received by the teacher and student. It retains the former approach to the subject by developing "the study of plants and animals simultaneously, teaching both as living organisms which carry on the same general life processes with their differences appearing in structure and in the nature of the machinery by which they function." The authors are to be congratulated particularly for introducing the student to the scientific method at the beginning of the text. This excellent, easily readable, and adequately illustrated book is very highly recommended.

UNDERSTANDING HEREDITY, by Richard B. Goldschmidt. John Wiley & Sons, New York. 1952. pp. 228. illus. $3.75.

This book was written by an outstanding authority on the subject to fill the "need for a short and easily readable survey of the basic facts of genetics, which will enable also the non-biologist to grasp with only little effort the essentials of that fascinating science." Beginning with the chapter on heredity and non-heredity traits, the author proceeds to the more detailed presentation of the mechanisms of heredity. The text is adequately illustrated, and the author succeeds in making the subject interesting by relating the facts to the common experiences of man. This book is very highly recommended.

RESPIRATION IN PLANTS, by Walter Stiles and William Leach. 3rd. ed. John Wiley & Sons, New York. 1952. pp. 172. illus. $2.25.

This is a revised 3rd edition of a standard work on the principles of plant respiration. As already indicated in the earlier editions, the authors "have aimed at giving an account of the nature of plant respiration which is readable and understandable by the elementary student of botany and which at the same time contains sufficient information to render it a volume to the advanced student." This revised edition is indispensable to all interested in the subject of plant respiration.

MORPHOGENESIS IN PLANTS, by C. W. Wardlaw. John Wiley & Sons, New York. 1952. pp. 176. illus. $2.25.

In this important new book an attempt is made "to set out some of the leading ideas relating to morphogenesis in plants, and to illustrate positive results thus far achieved by effective examples." Finally, with the data of the survey before the reader, "some of the general issues and conceptions which have emerged are briefly considered." This stimulating book is highly recommended.

THE MOLECULAR ARCHITECTURE OF PLANT CELL WALLS, by R. D. Preston. John Wiley & Sons, New York. 1952. pp. 211. illus. $6.75.

The main portion of this text is "concerned with the detailed architecture of cell walls in a wide variety of plants, including growing cells, and an attempt is made to interpret growth processes in terms of the structure thus revealed." Brief accounts are also given of the "more important physical and chemical approaches to cellulose structure," and some explanatory account of the anatomy of development of the tissues under review. This first review in England of those aspects of plant cell "wall studies of greatest appeal to botanists" will be enthusiastically received.

INTRODUCTORY MYCOLOGY, by C. J. Alexopoulos. John Wiley & Sons, New York. 1952. pp. 482. illus. $7.00.

This fascinating book on the fungi, including also chapters on the bacteria and slime molds, written for "the student who knows nothing about the fungi and who needs an orderly presentation" of the subject

fills a long felt need. It "is not intended as a complete treatise on the fungi, and is not intended as a reference book," but "is to answer as simply and concisely as possible the question: 'what are fungi and how do they affect us?' ". The author has succeeded in achieving his objective in this adequately illustrated, easily readable book which is highly recommended.

SOIL MICROBIOLOGY, by Selman A. Waksman. John Wiley & Sons, New York. 1952. pp. 356. illus. $6.00.

This important text by an outstanding authority aims "to survey the nature and abundance of microorganisms in the soil, to review the important role that they play in soil processes, and, so far as possible, to show the relation between them and soil fertility (including plant nutrition and crop production)." The book is adequately illustrated and the author has succeeded in achieving the objectives as stated in an easily readable text. It is highly recommended.

PATHOLOGY IN FOREST PRACTICE, by Dow V. Baxter. 2nd ed. John Wiley & Sons, New York. pp. 601. illus. $7.50.

This 2nd revised edition of a widely used text is "intended for the student, the timber grower who is interested in the health of the forest, and the lumber user who is concerned with the soundness of its products." and "integrates pathology with other branches of forestry such as silvics, silviculture, management and wood technology." The book is adequately illustrated, easily readable, and is indispensable to the forester, the plant pathologist, the arboriculturist, the tree surgeon, and the landscape engineer.

PROBLEMS OF LIFE, by Ludwig von Bertalanffy. John Wiley & Sons, New York. 1952. pp. 216. $4.00.

This is an English translation of the author's German original, and is subtitled, "An Evaluation of Modern Biological Thought." The author first presents a survey of basic biological problems and laws within the framework of the organismic conception (of life), then proceeds to questions of biological knowledge, and finally to the general principles of a modern conception of the world and the claim for a "General System Theory." This very stimulating book is highly recommended to all students and workers in the various sciences.

METHODS OF STATISTICAL ANALYSIS, by Cyril H. Goulden. 2nd ed. John Wiley & Sons, New York. 1952. pp. 467. illus. $7.50.

This 2nd edition of a standard text in the general field of applied statistics is "slanted rather definitely towards the needs of the student who is now, or will eventually be, a research worker." The subject is treated "with pronounced emphasis on experimental design," and "detailed methods for the statistical analysis of experiments of basic design are presented." This excellent book is highly recommended.

INTRODUCTION TO SOIL SCIENCE, by G. W. Leeper. 2nd ed. Cambridge Univ. Press, Amer. Branch, 32 E. 57th St., New York. 1952. pp. 222. illus. $5.00.

This 2nd edition of a standard text presents "a short account of soil science as it exists in the middle of the 20th century," and is written primarily for Australians. Part I is concerned with the mapping, classification and formation of soils, Part II, with the physics of the soil, and Part III, with soil chemistry. A final chapter is devoted to soil erosion, and a section on soil analysis is added in the appendix. This excellent short treatise is highly recommended.

FAMILIES OF DICOTYLEDONS, by Alfred Gundersen, Chronica Botanica Co., Waltham, Mass. 1950. pp. 237. $4.50.

In the introductory section (Part I), the following subjects are discussed by collaborating authorities—Fossil Dicotyledons (Chester A. Arnold), Wood Anatomy (Oswald Tippo), Carpels and Ovules (Theodor Just), Embryology (Herbert F. Copeland), Cytotaxonomy (J. Herbert Taylor) and Plant Geography (W. H. Camp). This is followed by the author's sections on the Characters of the Dicotyledons (Part 2), Historical Notes (Part 3), and Systematic Arrangement (Part 4). In the major part of the book (part 4), he groups 240 families under 42 orders, and these in turn are grouped under 10 large, tentative groups beginning with Magnoliflorae, and branching through intermediate groups into the four climax groups Dianthiflorae, Jasminiflorae, Rubiflorae and the Ulmus Group. This most stimulating book is indispensable to all who are interested in plant systematics.

THE MERCK INDEX OF CHEMICALS AND DRUGS. 6th ed. Merck & Co., Rahway, N. J. 1952. pp. 1167. $7.50; thumb-indexed $8.00.

This 6th revised edition of a classic will be enthusiastically received. Its purpose, as in past editions beginning in 1889, is to provide "a concise, comprehensive, and reliable encyclopedia of chemicals and drugs for the chemist, pharmacist, physician, and members of allied professions." More than one thousand of the total number of pages are devoted to the brief listing of chemicals with a brief statement of structure, physical properties and use. It is thus a mine of information for the worker in biology and medicine. The reader should familiarize himself with the rest of the book so that these sections devoted to about 30 tables and lists may be consulted as the need arises. This thoroughly revised edition of the classic Merck Index is highly recommended.

THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

I. THE AMERICAN AMARYLLIS SOCIETY

[An integral branch of the APLS, and functions as a comprehensive Committee for the Advancement of the Amaryllids.]

[AMERICAN AMARYLLIS SOCIETY, continued from page 4.]

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Note: Introducers of new daylily clones should send plants directly to the Trial gardens for testing. As soon as practical each trial garden will publish, in HERBERTIA, lists of the 10, 25, 50 and 100 best daylilies, on the basis of the clones tested, for the climatic region in which it is located.

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III. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

BOOKS

1. AMARYLLIDACEAE: TRIBE AMARYLLEAE, by Traub & Moldenke (including the genera Amaryllis, Lycoris, Worsleya, Lepidopharynx, Placea, Griffinia, and Ungernia; Manila covers; 194 pages, incl. 18 illustrations. $4.00 postpaid.

This is required reading for every amaryllid enthusiast.

2. DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948, by Norton, Stuntz, and Ballard. A total of 2695 Hemerocallis clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (I—X; 1—90), including a portrait of George Yeld. $1.50 postpaid.

PERIODICALS

(A) HERBERTIA [First series, 1934 to 1948, incl.], devoted exclusively to the amaryllids (Amaryllidaceae), and the workers concerned in their advancement. A complete set of these volumes is indispensable to all who are interested in the amaryllids. Libraries should note that this is the last opportunity for complete sets.

Volume 1 (1934). Dedicated to Henry Nehrling. Containing the biography of Henry Nehrling, and many valuable articles on amaryllis; with a portrait of Henry Nehrling and 16 other illustrations; a total of 101 pages.

Volume 2 (1935). Dedicated to Theodore L. Mead. Containing the autobiography of Theodore L. Mead, and many excellent articles on varieties, breeding, propagation, and culture of amaryllids; with portraits of Theodore L. Mead and David Griffith and 18 other illustrations; a total of 151 pages.

Volume 3 (1936). Dedicated to Arthington Worsley. Containing the autobiography of Arlington Worsley, and important articles on description, genetics and breeding, physiology of reproduction, and amaryllid culture; with 3 portraits of Arlington Worsley, one color plate, and 30 other illustrations; a total of 151 pages.

Volume 4 (1937). First British Edition. Dedicated to William Herbert. Containing the biography of William Herbert; the reprint of Herbert's essay, "On Crosses and Hybrid Intermixtures in Vegetables"; Dr. Darlington's essay, "The Early Hybridizers and the Origins of Genetics," and many important articles on description; cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with two portraits, forty-four other plates and three figures; a total of 280 pages.

Volume 5 (1938). First Netherlands Edition. Dedicated to Ernst H. Krelage. Containing the autobiography of Ernst H. Krelage; the history of amaryllid culture in Holland by Ernst H. Krelage, Dr. Uphof's important article in which the name Hippeastrum is rejected; a revision of the tribes of the Amaryllidaceae; and the species of Amaryllis; outstanding articles on forcing amaryllis by Dr. Grainger and Prof. Dr. van Slogteren; and many other articles on description, cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with 33 plates and 2 figures; a total of 218 pages.

Volume 6 (1939). Dedicated to the Union of South Africa, and containing articles on South African amaryllids, including the history of botanical exploration for amaryllids in South Africa, the distribution of South African amaryllids in relation to rainfall, and a review of the genus Agapanthus by Frances M. Leighton, a review of the Genus Cyrtanthus, with many excellent line drawings, by Dr. R. A. Dyer; other articles—Zephyranthes of the West Indies by Dr. Hume; the Tribe Gilliesieae by Dr. Hutchinson; rating of daylilies for garden value by Mr. Kelso; daffodil articles by Jan de Graaff, and many other items on description, cytology, breeding, propagation, and amaryllid culture; with 44 plates and 10 figures; a total of 258 pages.

Volume 7 (1940). Dedicated to Latin America, and featuring articles on Latin American amaryllids; biographies of Drs. Philippi and Holmberg; report by Dr Goodspeed on the amaryllids collected by the Univ. of Calif., Second Andean Expedition; reports on the flowering of the "Blue Amaryllis," A. procera; and many other important articles on the description, propagation, breeding, culture, harvesting

and storage of amaryllids. Of special interest are the important articles on the description, breeding and culture of daylilies by noted authorities. With 45 illustrations—30 plates and 15 figures—and a total of 242 pages.

Volume 8 (1941). First Daylily Edition. The first extensive symposium on the daylily, containing biographies of George Yeld, Amos Perry, Hans Sass, and Paul Cook, and important articles on daylily evaluation, breeding, propagation and culture. Also important articles on Narcissus and other amaryllids. Thirty-eight illustrations—27 plates and 11 figures—and a total of 185 pages.

Volume 9 (1942). First Alstroemerid Edition. Dedicated to Harry L. Stinson, the outstanding authority on this plant group, who contributes a summary of his work on Alstroemerid taxonomy, breeding, propagation and culture. This volume contains the autobiography of Prof. Dr. Abilio Fernandes, the Check-List of Amaryllids by Major Pam, and a review of the species of Crinum by Dr. Uphof, and also many important articles on daylilies, Narcissus, Cyrtanthus, hybrid Amaryllis, Ixiolirion and other amaryllids. Thirty-five illustrations—17 plates and 18 figures—and a total of 243 pages.

Volume 10 (1943). 10th Anniversary Edition. Dedicated to Elizabeth Lawrence, the outstanding authority on the use of amaryllids in the garden, who contributes a summary of her work in this field. This volume contains the review of Agapanthus and Tulbaghia, by Dr. Uphof; and article on Brunsvigia rosea and hybrids by Mr. Hannibal; a symposium on Narcissus breeding by Messrs Powell, Reinelt, Berry and Reynolds; a review of amaryllid chromosomes by Dr. Flory; articles on hybrid amaryllis, daylilies, and many other important articles on amaryllids. Forty-one illustrations—12 plates and 29 text figures—and a total of 205 pages.

Volume 11 (1944). First Allieae Edition. Dedicated to Dr. Henry A. Jones, the eminent American authority on the onion. This is one of the most outstanding issues up to the present for its record making contributions on the systematics of Allium by British authorities, and on onion breeding, propagation, and culture by American authorities. It contains Mr. Airy Shaw's translation of Vvedensky's Alliums of the Soviet Union; Stearn's essay on the onion in the Old World and other articles; and articles on onion breeding, propagation and culture by Dr. Jones and his colleagues. There are also important contributions on ornamental Alliums for North America, and Allieae of North America. There are excellent articles on hybrid Amaryllis, Daylilies and various other amaryllids. Forty-three illustrations—25 plates and 18 text figures—and a total of 369 pages.

Volume 12 (1945). First Educational Edition. Dedicated to Supt. R. C. Huey, a pioneer in the use of amaryllids as an educational tool. This volume contains a brief autobiography by Supt. Huey, and an article by him on the use of amaryllids in teaching plant science; the announcement by Mulford B. Foster of the reintroduction of the sweet-scented Alstroemeria caryophyllaea, and an article by Harry L. Stinson on the true Alstroemeria Ligtu. This issue also contains an article on the origin of Tapeinanthus humilis by A. & R. Fernandes; important articles on Narcissus breeding; Leucocoryne and related genera; articles on various other amaryllids, including valuable contributions on Hemerocallis description and appreciation, breeding, culture, and packing daylily plants for shipping. Twenty-four illustrations—15 plates and 10 text figures—a total of 180 pages.

Volume 13 (1946). First Narcissus Edition. Dedicated to Guy L. Wilson, the noted Narcissus breeder. This volume contains an autobiography of Mr. Wilson, an article on his breeding activities; an article on Narcissus breeding in Australia by Mr. Alston; articles by American Narcissus breeders, including Frank Reinelt, E. P. Powell, J. S. Cooley, C. W. Culpepper and W. R. Ballard; an article on the karyology of the subgenus Ajax of the genus Narcissus by A. and R. Fernandes; a list of parents of hybrid Narcissus by Arno H. Bowers; Narcissus diseases by C. J. Gould; Narcissus insects and mites by E. P. Breakey; Narcissus culture by various authors. There are also articles on other amaryllids—Hemerocallis, hybrid Amaryllis, Habranthus, Crinums, Lapagerias, Agapanthus, Hymenocallis, etc. Thirty-nine illustrations—186 pages.

Volume 14 (1947). 2nd Hemerocallis Edition. Dedicated to Ralph W. Wheeler, the noted Daylily breeder. This volume contains an autobiography of Mr. Wheeler and an article on his breeding activities; and many important articles on

Hemerocallis description, evaluation, breeding, etc., from various parts of the country. There are also important articles on other amaryllis—Hybrid Amaryllis, amaryllids in the Holy Land and Mexico, starch in Alstroemeria, the Galantheae, Double Narcissus, Zephyranthes, Sternbergia, Allum, etc. Twenty-eight illustrations—206 pages.

Volume 15 (1948). 2nd South African Edition. Dedicated to Dr. R. A. Dyer. This volume contains an autobiography of Dr. Dyer and two amaryllid articles by him, and other articles on South African amaryllids. There are also important articles on Hemerocallis Amaryllis, Crinum, Narcissus, Brodiaea Lilies, Alstroemerias and other amaryllids by various authors. Forty-one illustrations—177 pages.

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A limited number of volumes of **Plant Life,** including **Herbertia,** second series, are available, all quotations subject to prior sale.

Vol. 1 (No. 1). 1945. Symposium on Narcissus breeding by various authors. Vol. 1 (Nos. 2 & 3), First Bromeliaceae Edition. Profusely illustrated symposium on the bromels by Dr. Lyman B. Smith, Mulford B. and Racine Foster, David Barry, Jr., Ladislaus Cutak, and Wyndham Hayward. 25 illustrations—105 pages.

Vol. 2 (Nos. 1—3). 1946. Verbenaceae Edition. Illustrated treatise on the Verbena Family by Dr. and Mrs. Moldenke, the outstanding authorities on this plant family. 9 illustrations—100 pages.

Vol. 3 (Nos. 1—3). 1947. General Edition. Containing an illustrated article on winter and spring flowering Gladiolus by W. M. James, and articles on the Dutch Bulb Industry by Dr. A. J. Verhage and J. F. Ch. Dix. 10 illustrations—42 pages

Vol. 4 (Nos. 1—3). 1948. Aroid Lily Edition. An illustrated treatise primarily on the genus Zantedeschia (Aroid Lily) containing articles by Hamilton P. Traub, A. A. Longmire, Fred M. Danks, H. M. Butterfield, Wyndham Hayward and Len Mirzwick. 11 illustrations—48 pages.

Vol. 5 (Nos. 1—4) 1949, 34 illustrations, a total of 134 pages.

Nos. 1—3. **Gesneriaceae Edition,** with important articles on the subject by F. L. Smith, W. Hayward and the Moshers.

No. 4. **1949 HERBERTIA Edition, devoted exclusively to the amaryllids;** the **First Australian Edition,** dedicated to Capt. C. O. Fairbairn, with biographies of Australian amaryllid pioneers, and articles on Australian amaryllids, South African amaryllids, the Pink Amaryllis, **A. belladonna** var. **Haywardii,** with illustration, hybrid Amaryllis breeding in South Australia by E. Both, Narcissus culture by Dr. Cooley, Mr. Mitsch and Mr. Ballard, and also important articles on other amaryllids.

Vol. 6 (Nos. 1—4) 1950. 47 illustrations, a total of 162 pages.

No. 1. **1950 HERBERTIA Edition, devoted exclusively to the amaryllids;** the Hybrid Amaryllis Edition; dedicated to Mrs. Mary G. Henry, containing Mrs. Henry's autobiography; articles on Collection Amaryllids in South America by M. B. Foster; Amaryllis flower types; double Amaryllis; Amaryllis of To-morrow, by W. Hayward, and other articles on hybrid Amaryllis, Hemerocallis, Cyrtanthus, Blue Amaryllis, South African Amaryllids, Review of the genus Brunsvigia (part I) by R. A. Dyer, etc.

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Nos. 2—4. **Malvaceae Edition,** with articles on the Perfect Mallow Marvel by E. Sam Hemming, a new Hybrid Hibiscus, by Prof. Ballard, and propagation of Hibiscus, by Dr. Hava; and a report on plant culture activity in the Southwest Region by Dr. Corliss, the Plant Life Library (book reviews), the American Plant Life Society and Seeds and Plants Directory.

Vol. 9. (Nos. 1—4) 1953, with 32 illustrations, a total of 125 pages.

No. 1. **1953 HERBERTIA Edition, devoted exclusively to the amaryllids:** sponsored by the **American Amaryllis Society,** which is affiliated with the **American Plant Life Society.** This is the **Second Narcissus Edition,** dedicated to E. A. Bowles, containing a portrait of Mr. Bowles, and papers on Narcissus; a review of 40 years devoted to Narcissus breeding by Guy L. Wilson, an article on miniatures, naturaliz-

ing, decoratives, and a beginners' list by C. E. Quinn, fall-flowering Narcissus by L. S. Hannibal, Narcissus breeding by E. C. Powell, and W. R. Ballard, Daffodils in piedmont Virginia by H. I. Tuggle, old naturalized Narcissus in the South by Mrs. Evans, Daffodils in 1952 by Grant E. Mitsch, and Daffodils in northern California by H. I. Johnson.

There are also articles on other amaryllids, including reviews of Amaryllis Shows in New Orleans and Houston, papers on the evaluation of Hybrid Amaryllis by Mr. Manley and Dr. Thornburgh, an article on Allium by R. B. Freeman, Amaryllis species by Mrs. Mary G. Henry, the Orpets, and Mr. Burlingham, Hemerocallis by S. E. Saxton, George Gilmer, and W. R. Ballard, Calostemma by Mr. Chandler, Crinum scabrum by Thad M. Howard, Lycoris by Wyndham Hayward, Hymenocallis by Len Woelfle, and on other amaryllid subjects, including the description of two new Amaryllis species.

Nos. 2—4. **Agavaceae Edition,** with articles on Dracaena and Cordyline by Mrs. Morris Clint, The Tribes and Genera of the Agavaceae, and Polianthes tuberosa by Hamilton P. Traub, Beaucarnea recurvata by Mulford B. Foster, and sections on The Plant Life Library (book reviews), the American Plant Life Society, a complete list of publications, and Seeds and Plants Directory.

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IV. PLANTS RECEIVING APLS AWARDS IN 1952

The following awards were made since 1951.

xCyrtanthus clone FAIRY HILL; A. M., January 4, 1952. Presented by Mrs. Mary G. Henry, Gladwyne, Penna. An excellent pot plant, and a very charming subject out of doors in California; blooming during the winter, and again later in the year. [No. 132]

xAmaryllis clone SNOW QUEEN; A. M., April 11, 1952. Presented by Mr. Wyndham Hayward, Winter Park, Florida. A fine 4-flowered pure white form that is easy to handle under ordinary pot culture. [No. 133]

xAmaryllis clone NIVALIS; A. M., April 11, 1952. Presented by Mr.

Wyndham Hayward, Winter Park, Florida. A fine form that is easy to handle under ordinary pot culture, 3—4-flowered, white. [No. 134]

Narcissus triandrus var. *concolor*, A. M., December 18, 1952. Presented by Dr. A. Fernandes, Coimbra, Portugal. A fine self yellow, free-flowering under out door culture in southern California. [No. 135]

[Clint—DRACAENA AND CORDYLINE, continued from page 133.]

and several shoots may be expected from a 4″ cutting, the little shoots should be taken off with a small portion of the old stem when they have developed about six leaves, and re-rooted. At this date, the first week in June, all cuttings are potted and about 10% of the little plants have been re-rooted and potted in small pots. These will be carried along as fast as their growth will permit and should be a foot or more high by fall. If plants are wanted for the garden, planting directly in the ground is perhaps quicker. Rooting is slower, but growth more rapid thereafter. Usually enough shoots will develop to sufficiently cover the unsightly stem.

[Burlingham—AMARYLLIS BELLADONNA, continued from page 124.]

season, and it disappeared. In my ignorance I reasoned that the Amazon Lily, *Eucharis grandiflora* might be a *Lilium*, and liliums can be propagated from scales. So I peeled off seven pieces from the outer layers of the bulbs (which were later identified as *Amaryllis belladonna* Linn.), and planted them midway between the two rows. The result is two small bulbs. The pieces received no care, and almost no water during the dry season, and I am amazed that even two bulbs resulted, but this is apparently due to the small amount of stem tissue at the base of the leaf scales.

In three years one of the original *Amaryllis belladonna* Linn. resulted in a clump of nine bulbs. I have not disturbed them. The other bulb of that species, planted eighteen inches from the first, grew into such a large clump that on July 14, 1951, I dug up the clump. I took out 28 rooted bulbs, which I replanted in new locations. One of the 28 bulbs, three and a half inches in diameter, which I presume was the original bulb, had attached to it 16 offsets. The bulb with its offsets presented such confusion that I could not tell which offsets were rooted. I did not want to pot any, and I did not want to plant an unrooted offset in full sun, so I replanted the twenty-eighth bulb with its sixteen offsets still attached. The two original bulbs of *A. belladonna* Linn., did not receive differential treatment and the results are unexplained at present.

Editorial note.—*Amaryllis belladonna* Linn. bulbs planted deeply do not form offsets as readily as those planted shallowly.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 53.]

ported by a very short, 2 mm. long, lacerate, scarious spathe. This much can be seen from the dried specimen sent by Tineo.

Nothoscordum vernum R. A. Phil., Anal. Univ. Chile *93:* 267. 1896. Leaves narrowly linear, equaling the scape; umbel few-flowered; flowers 2 to 5; spathe-valves oblong-lanceolate, hyaline-membranaceous, much shorter than the pedicels; sepals oblong-lanceolate, coalescent and becoming yellowish at the base, the mid-vein becoming violet on the outer surface; filaments yellow, scarcely 1½ times as long as the sepals; style equaling the filaments, twice as long as the ovary. Found on the seashore at Concon in October, 1884, by F. Philippi.

Nothoscordum brevispathum R. A. Phil., Anal. Univ. Chile *93:* 268. 1896. Leaves narrowly linear, shorter than the scape; scape 20 to 25 cm. tall; spathes scarious, ovate, only 8 mm. long; umbel 3- or 4-flowered; pedicels twice as long as the spathe, equal to or 1½ times as long as the perigonium; segments of the perigonium ovate-lanceolate, white, with a purple vein dilated at the base; stamens and style equaling the perigonium. It grows in the Illapeline Andes at a place called Las Mollacas.

Nothoscordum nidulans R. A. Phil., Anal. Univ. Chile *93:* 268. 1896. Bulbs clustered; leaves shorter than the scape, 10 mm. *wide;* flowers in a rather flat umbel, about 10, shortly pedicellate; pedicels equaling the spathe and perigonium; segments of the perigonium connate for one-fifth their length; filaments longitudinally dilated for almost their whole length; style many times surpassing the ovary, equaling the capsule. Common in fertile gardens at Santiago, where it is called *Allium roseum* by gardeners.

Brodiaea patagonica Speg., in Rev. Facult. Agron. Vet. La Plata *3:* 576-577. 1897. Triteleia, 1-flowered, with ovate bulb, leaves synanthous, very narrowly linear, plicate, rather obtuse at the apex, the scape somewhat longer, erect, glabrous, slender, 2-bracteate at the apex, the flower subtubular, borne on a pedicel half as long, its 6 segments linear, acute, subequaling the tube, white, marked with green lines. It grows commonly in grassy places along the Rio Santa Cruz, where it was collected in 1874 by C. Berg, and in 1882 by Carlos Spegazzini, and at the Gulf of San Jorge, where it was collected in February, 1896, by Carlos Ameghino.

Observations: Bulb rather deeply (3 to 4 cm.) buried, ovate, 15 mm. long, 8 to 10 mm. in diameter, clothed with thin subhyaline tunics, bearing 3 to 5 leaves and 1 or 2 scapes at the apex; leaves synanthous, fasciculate, green, very narrowly linear, 4 to 8 cm. long, 1 to 1.5 mm. wide, rather obtuse and subcallose at the apex, ampliate into a thin sheath at the base, the exposed portion plicate, the buried portion obtusely carinulate; scapes slightly surpassing the leaves, 5 to 10 cm. long, 0.8 to 1 mm. in diameter, terete, glabrous, smooth, green, naked, erect, simple, 2-bracted at the summit; bracts lanceolate, 16 to 20 mm. long, 3 to 4 mm. wide, long attenuate and very acute at the apex, sheath-

ing toward the base, shortly ochrea-like (the sheath 3 to 4 mm. long), thinly membranaceous, subhyaline, the outer one slightly larger, with 7 to 9 rather inconspicuous nerves, the inner one shorter, 4- or 5-nerved; pedicels erect, short, 5 to 8 mm. long; flowers solitary in the bracts and on the pedicels, erect, the tube subcampanulate from the terete base, 10 mm. long, 2 to 3 mm. in diameter, crowned at its apex by 6 wide-spreading subequal lobes which are linear (rarely lanceolate), long attenuate-acute toward the apex, 10 to 15 mm. long, 1 to 2.5 mm. wide, white, marked with a rather broad central greenish line which runs down to the base of the tube; stamens 6, the 3 opposite the outer segments included and attached below the middle of the tube, the 3 opposite the inner segments slightly exserted and attached at the mouth of the tube; filaments glabrous, slender; anthers yellow; ovary elliptic, 3 to 3.5 mm. long, 1.5 mm. in diameter, green, glabrous; style elongate, 13 mm. long, slender, scarcely 3-lobed at the apex; fruit capsular, from globose to obovate, obscurely trigonous, included by the more or less marcescent and not at all or slightly thickened perigonium. Specimens vary from green to somewhat violet-colored.

The species is related to *Brodiaea (Tritelcia) uniflora* Lindl., but the compared specimens seem to differ at once by the conspicuously narrower, shorter, non-glaucous leaves, smaller stature, etc. Here belongs in part the *T. uniflora* of Hieronymus (not Lindley) in Hier., Sert. Pat. f. 53, n. 146.

Crinum norfolkianum A. Cunn., Jour. Bot. Lond. *1:* 123. 1842. Leaves smooth along the margin, pedicels longer than the small ovary, stamens half as long as the lanceolate segments, filaments 5 to 6 times as long as the anthers.

Pancratium donaldii Blatter, Jour. As. Soc. Beng. *26:* 360. 1931. Closely related to *P. parvum Dalz.* and also to *P. st. mariae* Blatt. & Hallb. It differs from the first by its broad conic corona and very stout scape, from the other by its style not being included and the tube of the perianth much longer and also distinctly trigonous.

Milla brevipes Baker, Jour. Linn. Soc. Bot. *11:* 386. 1871. Leaves 4 to 8, 3 inches long, 2.5 mm. wide; scape somewhat shorter than the leaves; spathe-valves 2, connate at the base, the free part 12 mm. long; umbels 3-flowered; pedicels scarcely 2 mm. long; perianth white, 10—12 mm. long, the segments lanceolate, brown-carinate, four times as long as the tube; stamens in 2 series; filaments filiform, flattened toward the base; ovary sessile. Chile.

Brodiaea recurifolia C. H. Wright, Bull. Misc. Infor. Kew, p. 117. 1915. Related to *B. sellowiana,* differing in its narrower perianth-segments. Bulb ovid, up to 1 cm. in diameter; leaves synanthous, linear, obtuse, recurved, flat, glabrous, very minutely denticulate at the margins, 6 cm. long, 2.5 mm. wide; peduncle 2 cm. long, 1-flowered, slender; spathe 18 mm. long, membranous, 2-lobed; pedicel 1 to 3 mm. long; perianth white or pale-yellow, the tube 1.5 cm. long, the lobes elliptic, obtuse, 6 mm. long, 3 mm. wide, 1-nerved; anthers sagittate, 3 mm. long; staminodes oblong, 1.5 mm. long; ovary subglobose, the cells 10- to 12-

ovulate; style 1.5 cm. long; stigma shortly 3-lobed. Uruguay.

Brodiaea circinata Sandwith, in Hooker's Ic. Pl. 5th. ser. *4:* pl. 3350. 1937. Perennial herb, remarkably rhizomatous below the bulb, the rhizome up to 8 mm. thick, giving rise to many long roots up to 1.5 mm. thick; the bulb itself oblong-ovoid, up to 2.5 cm. long and 1.5 cm. in diameter, covered by membranous white-hyaline striate sheaths; the whole sheath very long, extending to 7.5 cm. beyond the bulb, when dry up to 7 mm. wide, surrounding the leaves and scapes, unilaterally spathaceous-split 2 to 3.5 cm. below the apex; leaves 3 or 4, synanthous, glaucous, toward the apex almost always conspicuously recurved-circinate, obtuse at the apex itself, about 10 to 16 cm. long, equaling the flowers or slightly surpassing them, 3 to 5.75 mm. wide above, much narrowed below; scapes 1 or 2, becoming purplish, 7.5 to 13 cm. long, up to 2 mm. wide above when dry; spathe-valves 2, connate near the base, white-membranous, violet-nerved, 1.8 to 2.1 cm. long, up to 7 mm. wide, obtuse, erect and rather closely including the tube of the perianth; flowers solitary, sessile, white, translucent, erect; perianth-tube narrowly funnelform-campanulate, 1.2 to 1.4 cm. long, 6 mm. wide at the apex, violet-striped when dry; the segments spatulate, rounded-obtuse and lightly cucullate (later emarginate) at the apex, greatly narrowed below, clawed, 1.7 to 1.8 cm. long, 6 to 8 mm. wide, white, membranaceous, but the median longitudinal zone thicker, drying olivaceous-brunneous and conspicuously 3-nerved on the inside; stamens 6, all inserted about 8 mm. above the base of the tube; filaments unequal, the alternate longer ones 10 mm. long, the others 8 mm. long, without appendages; anther-cells oblong, 2 to 3.75 mm. long; ovary ovoid-ellipsoid, about 5 mm. long and 2.3 mm. in diameter, the stalk about 2 mm. long, adnate to the tube of the perianth; style 1.15 cm. long, very shortly and obtusely 3-stigmatiferous at the apex; fruit not seen. Argentina.

Milla uniflora Graham, (in Jour. Linn. Soc. Bot. *11:* 382. 1871.) Bulb ovoid, proliferous, membranaceous-tunicated, 12 to 18 mm. thick, with roots, the outer membranes upwardly long-protracted; leaves 6 to 9, synanthous, fleshy-herbaceous, 6 to 12 inches long, 3 to 6 mm. wide, glaucous; scapes 1- or in gardens very rarely 2-flowered; spathe-valves 2, lanceolate, 1.8 to 3 cm. long, connate toward the base; pedicels 1 to 2 inches long; perianth 1.8 to 3.6 cm. long, pale-lilac, the segments lanceolate-spatulate, in the expanded flower rather spreading, with a thicker keel, somewhat longer than the funnelform tube which is 4 to 5 mm. wide at its mouth; stamens in 2 series in the tube; filaments filiform, slightly longer than the anthers, the upper ones reaching to the throat; ovary sessile; style filiform, 6 to 8 mm. long. Collected at Buenos Aires by Gillies and by Tweedie.

Milla uniflora var. *conspicua.* Segments oblong-spatulate, less narrowed toward the base, broadly imbriate in the expanded flower; pedicels often longer. Collected at Montevideo, Tweedie 1389, Gilbert s. n.

Milla uniflora var. *tweedieana* Baker, Jour. Linn. Soc. Bot. *11:* 382-383. 1871. Much smaller, the leaves scarcely more than 1 mm. wide; scape 2 to 3 inches long; pedicels 6 mm. long, scarcely exserted from

the spathe; perianth 10 to 12 mm. long, the segments oblong-spatulate, equaling the tube; stamens all distinctly exserted from the tube. Collected at Buenos Aires by Tweedie. Probably a true species.

Milla nivalis Baker, Jour. Linn. Soc. Bot. *11:* 383. 1871. Bulb ovoid, membranaceous-tunicate, the external membranes much prolonged upwards; leaves 5 or 6, green, fleshy-herbaceous, synanthous, 6 to 9 inches long, 3 mm. wide; scapes subequaling the leaves; valves of the spathe 2, lanceolate, 1 inch long, connate at the base; umbels 2- or 3-flowered; pedicels 6 to 30 mm. long; perianth funnel-form, 18 to 20 mm. long, the segments linear, green, fleshy, acute, spreading in the expanded flower, the tube cylindric, scarcely more than 2 mm. wide at the mouth, twice as long as the segments; anthers sessile, in two distinct series within the tube; ovary sessile, lanceolate; style filiform, 3 mm. long. Collected by Germain in Chile.

Milla porrifolia Baker, Jour. Linn. Soc. Bot. *11:* 386. 1871. Bulb ovoid, 16 to 24 mm. thick, membranous-tunicate; leaves 4 or 5 synanthous, fleshy-herbaceous, 6 to 8 inches long, 2 to 4 mm. wide; scape subequaling the leaves; valves of the spathe 2, lanceolate or linear, 16 to 24 mm. long, connate at the base; umbels 4- to 6-flowered; pedicels 12 to 18 mm. long; perianth funnel-form, whitish-violet, 18 to 20 mm. long, the segments lanceolate-spatulate, 3 times as long as the tube; stamens in 2 series from the tube; filaments 5 to 6 mm. long; ovary sessile; style filiform, 8 mm. long. Collected in Chile by Philippi, Germain, and Beechey.

Milla patagonica Baker, Jour. Linn. Soc. Bot. *11:* 382. 1871. Bulb not seen; leaves 4 or 5, synanthous, filiform, somewhat firm, 6 to 9 inches long; scape 1-flowered, 4 to 6 inches long; valves of the spathe 2, lanceolate, erect, 16 to 18 mm. long, connate at the base; pedicels 12 to 18 mm. long; perianth 20 to 22 mm. long, pale-lilac, segments lanceolate, acuminate, erect, twice as long as the narrowly funnel-form tube; stamens in two series; filaments filiform, 6 to 8 mm. long; ovary sessile; style 6 mm. long. Collected in Patagonia by Captain Middleton. It has the habit of *M. uniflora,* but differs in its filiform leaves and lanceolate acuminate perianth-segments.

Milla sessiliflora Baker, Jour. Linn. Soc. Bot. *11:* 382. 1871. Bulb ovoid, 6 to 8 mm. thick, membranous-tunicate, the external membranes much elongated; leaves 4 or 5, synanthous, fleshy-herbaceous, filiform, surpassing the flower; scape 24 to 30 mm. long; valves of the spathe 2, linear, connate for a long distance downwards; flowers solitary, sessile in the spathe, whitish, 18 to 20 mm. long, the segments ascending, lanceolate, a half to a third as long as the very slender tube; stamens inserted in 2 series above the middle of the tube; filaments filiform; anthers oblong, one-third to one-quarter as long as the filaments; ovary sessile; style 10 to 12 mm. long. Collected in Chile by Philippi and Germain.

[Moldenke—AMARYLLID GENERA AND SPECIES, continued on page 160.]

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[Moldenke—AMARYLLID GENERA AND SPECIES, continued from page 153.]

Milla setacea Baker, Jour. Linn. Soc. Bot. *11:* 385. 1871. Bulb ovoid, 6 to 8 mm. thick, membranous-tunicate, the external membranes much prolonged upwards; leaves 5 or 6, synanthous, 3 to 4 inches long, setaceous, rather firm; scape filiform, glabrous, 2 to 3 inches long, always 1-flowered; valves of the spathe 2, linear, 6 to 8 mm. long, connate at the base; pedicels 3 to 4 mm. long; perianth funnel-form, white, 9 to 10 mm. long, slender, the segments oblong-spatulate, subacute, "the flesh (or fleshy parts) pale brown," three or four times as long as the campanulate tube; stamens inserted at the throat of the tube, slightly 2-seriate; filaments filiform, 3 to 4 mm. long; ovary sessile; style filiform, 4 mm. long. Collected by Tweedie at Tucuman.

Strumaria chilensis Molina, in Sagg. Chili. ed. 2. p. 130; 284. 1810. Leaves linear; flower alternate, larger; struma free.

Zephyranthes pumila (Spin.) M. Roem., Syn. Ensat. p. 122. 1847. Flowers pedunculate; spathe monophyllous, 1-flowered, longer than the pedicel, including the pedicel, bifid; perigonium erect, its tube rather long; leaves linear, erect, subequaling the scape, channelled; spathe acute, surpassing the tube of the regular perigonium (the tube being much longer than the limb); stamens included. Closely related to *Z. atamasco,* in which the spathe is much shorter, the tube equalling the

limb; in our species the tube is much longer than the limb, which is also completely included by the spathe; the limb is scarcely expanded to such a degree as in *Z. atamasco*. The plant is very doubtful.

Pancratium santamariae (err. *st. mariae)* Blatt. & Hall. Jour. Ind. Bot. *2:* 52. 1923. Perennial glabrous herb; bulb globose, 4 cm. in diameter, the tunics membranous, pale brown, venose, the neck distinct, 2—5 cm. long, sometimes with two necks out of the larger of which issues the scape; roots arising from the margins of a basal disk attaining a diameter of 2 cm.; leaves appearing after the flowers, about 5, linear, fleshy, equaling or somewhat longer than the scape, 15 mm. wide, obtuse at the apex; scape strong, 15—20 cm. tall, delicately longitudinally striate, 2-edged, gradually diminishing from the thicker base, the diameter at the base 7 and 4 mm.; spathe one; umbellately 4- or 5-flowered, hyaline, nerved, about 2.5 cm. long, broadly ovate, somewhat unequally bifid, the lobes acuminate; pedicels variable, almost absent to 10 mm. long, somewhat trigonous, strong; tube of the perigonium up to 2.5 cm. long, greenish below, white above, somewhat trigonous, slender, somewhat ampliate at the apex, the segments white, about 2.2 cm. long, 5 mm. wide, lanceolate; corona 7—10 mm. long, cylindric, rugose, with 12 deltoid segments 2 mm. long; filaments subulate, shorter and narrower than the segments and of finer texture; anthers linear-falcate, unequally versatile, about 6 mm. long, 0.75 mm. wide, yellow; ovary ellipsoid-trigonous, 8 mm. long, 5 mm. wide, green, the ovules numerous; style filiform, 3.5—4 cm. long, included in the tube; stigma small, capitate; flowers withering after about 18 hours. In the affinity of the new species *P. parvum,* it nevertheless differs in its strong scape, numerous flowers, much shorter perigonium-tube, the lanceolate segments, and the included style. It was collected by C. McCann near Saint Mary's Villa in the village of Khandalla, Western Ghats mountains, province of Bombay, India. It flowers in the month of June (Herb. S.X.C. no. 19854) [=Herbarium of Saint Xavier's College]. See Figure 5.

Pancratium arabicum Sickenberger, Mem. Inst. Egypt. *4:* 290-291. 1901. Leaves appearing after the flowers, broadly scarious-dilated at the base, standing in a sheath protracted above the surface of the ground, more or less spirally twisted or flat and laterally curved; inflorescence lateral; floral spathe 2-parted, the "leaves" broadly ovate-lanceolate from the base, long-acuminate, surpassing the ovary, 4—5 cm. long, 1.5 cm. wide at the base, all scarious at the time of anthesis, scariously broad-costate and striate; pedicels one-third as long as the ovary; segments of the limb with a dilated dorsal line, green-flecked, corona cylindric, the limb divided into 12 broadly ovate-lanceolate, acuminate, reflexed teeth with a strong very agreeable odor; capsule ovate-subacuminate, 3.5 cm. long, 2.5 cm. in diameter, attenuate into a pedicel that is 2 cm. long, the valves of the mature capsule oblong-ovate. It flowers in the month of August. It grows on dunes in the vicinity of the sea and on calcareous sandy hills. Pays d'el Arich! Aboukir. W. Innes. Menagel near Mex! It differs from *P. sickenbergeri*, first seen along the seashores, by its elongate-ovate *(Iris*-like) capsules, each part

attenuate, not rotund-ovate with each part obtuse; from *P. aegyptiacum* by the leaves being membranous-dilated at the base and the capsules pedicellate, not subsessile; and from *P. maritimum* by its leaves being membranous-dilated at the base, the capsule ovate and pedicellate, not sessile and rounded—from all by its lateral inflorescence.

Strumaria bidentata Schinz, in Bull. Herb. Boiss. *4:* Append. III, pp. 46-47. 1896. Bulb subrotund, tunicated, white outside; leaves unknown; scape 9 cm. long, erect; flowers umbellate, 10—12; valves of the purplish spathe 2, lanceolate, cuspidate, rather erect; pedicels slender, erect; segments of the perigonium lanceolate, white, reddish at the base outside, 4 mm. long; filaments inwardly dilated, 2-dentate, very shortly connate at the base, beyond that filiform.

Pancratium tazetta Sessé & Moc., Fl. Mrx. ed. 2. p. 85. 1894. Narcissus with many-flowered spathe, nectary campanulate, plicate, truncate, one third as long as the petals, and flat leaves. It lives in Tacubaya and in very many places in Europe. Perennial.

Tulbaghia simmleri Beauverd, Bull. Herb. Boiss. ser. II. *8:* 988, fig. 2. 1908. Corona urceolate, crenate-trilobed, pale rose, one third as long as the similarly-colored calycinal limb; segments of the calyx ovate-oblong, rather obtuse, subequal, slightly shorter than the cylindric tube; bulb ovate, tunicated. Transvaal.

Hessea schlechteri O. Ktze. Rev. Gen. *3:* 310. 1893. This differs from H. stellaris, etc., by its larger flowers, the pedicels scarcely twice as long as the flowers and pubescent like the glandulose ovary. Natal.

Crinum strictum Hornemann, Enum. Pl. Hafn. 13. 1907. Leaves linear, strict, longer than the terete scape; flowers sessile, the tube longer than the limb; spathe of three "leaves".

Crinum lindleyanum Schult. f. ex Seub., in Mart. Fl. Bras. iii. I. 159. 1842-49. Leaves flat, linear-lanceolate, rather scabridous along the margins; flowers 4 or 5, shortly pedunculate; tube of the perigonium subequaling the limb; sepals revolute, undulate; stamens and style-apex colored. Leaves mostly longer than the scape, recurved; perigonium white, suffused with rose, strongly but not pleasurably odorous; stamens and style purple at the apex. Certainly this species, as well as the preceding [*Crinum undulatum* Hook.] very closely related to *C. erubescens* and perhaps is better made a variety of that, but this will have to be investigated later with living specimens. It grows in the province of Maragnanensi, Brazil (Don). It grows also in Surinam (Herbert). Perennial.

Beauverdia lorentzii Hert., in Bossiera *7:* 509. 1943. Bulb with the smell of *Allium*, globose, brown-tunicate, 15—20 mm. in diameter; leaves narrowly linear, subrigid, rather obtuse, flat, 1—2 dm. long; scape 1-flowered, hirtellous, 8—10 cm. long; valves of the spathe elliptic-acuminate, 12—14 mm. long, surpassing the pedicel which is 6—8 mm. long; tepals 6 or sometimes 8, equal, elliptic, rather acute at the apex, almost free at the base, golden-yellow, 1-nerved, 12—15 mm. long; filaments subulate, flat below, 7—8 mm. long; ovary obovate, 3 mm. long; style twice as long as the ovary, 4—6 mm. long, shorter than the anthers which are 2 mm. long; stigma ternate-capitate. Argentina.

Sternbergia alexandrae Sosnovsky, Trud. Bot. Inst. Akad. Nauk. SSR. Azerb. Fil. Baku *2:* 269-270. 1936. Leaves broadly linear, 11.5—15 cm. long, 7—8 mm. broad, opaque-green, narrowed toward the apex, obtuse at the apex, broadly canaliculate above, obtusely keeled along the middle beneath; flowers autumnal; spathe white, 2-plicate on the back, rather obtuse at the apex, somewhat split; perigonium yellow, about equaling the tube of the spathe, 1.5 cm. long, the segments broadly linear, to 4.6 cm. long, acuminate at the apex, subretuse, rather acute, the upper portion inside very shortly barbellate with white pellucid hairs; stamens 6 or 7 times shorter than the limb; capsule borne on a short (to 5 mm. long) peduncle, ovoid, to 2 cm. long; seeds ovid, black, foveolate-rugose, the aril crest-like, hazel-colored, folded. It differs greatly from *S. colchiciflora* W. K. in its leaves appearing after the flowers and at the time of flowering, in all dimensions, in the form of the segments of the perigonium, the proportion and certain characters of the stamens in reference to the limb. This plant is dedicated to the memory of my sainted mother. It lives in the republic of Azerbaijan, district of Szemakha, Kabistan, on Mount Kalendar-tepe, in the *Artemisit* association; cultivated in the botanical garden of Tiflis from bulbs collected by the distinguished N. Sachokia. It flowers in September; fruits in April to May.

Nothoscordum lloydiflorum Beauverd, in Bull. Herb. Boiss. ser. II. *8:* 998, fig. 2. 1908. Bulb subglobose, 10—12 mm. in diameter, gray-tunicate, with 1 or 2 scapes; leaves 2—6 cm. long, 1 mm. wide, narrowly linear, erect-patulous, flat, scabrellous along the margin, rather obtuse; scape 3—5 cm. long, 1-flowered, scabridous, shorter or equaling the leaves; valves of the spathe 7—9 mm. long, narrowly elliptic-lanceolate, surpassing the short (4—6 mm. long) pedicel; tepals 9—10 mm. long, elliptic, rather obtuse at the apex, almost free at the base, whitish, dark violet-unimerved; filaments 5—7 mm. long, flat, lanceolate, subulate, the alternate ones longer; ovary 2.5 mm. long, 1.75 mm. wide, obvate, the cells 6-ovulate; style 9.5 mm. long, slightly longer than the ovary, in length coming between the longer and shorter stamens; anthers 0.75—1 mm. long; stigmas capitate. Perennial. In fields, Independencia, dept. Canelones, Uruguay, May 3, 1908, C. Osten 5222.

Nerine filifolia var. *parviflora* Barker, Fl. Pl. S. Afr. *15:* pl. 568. 1935. It differs from the typical form in its smaller flowers.

Pancratium angustifolium Lojacono Projero, in Fl. Sic. *3:* 82, pl. 4, fig. 3. 1908. Bulb with the leaves narrowly linear, more slender than those of *Pancratium maritimum* L., 5—7 mm. wide, striate, very narrowly margined, ciliolate on the margins (!), very obtuse; scape slender, small, terete (not angular-compressed and two-edged); spathes 2, short, oblong-lanceolate; bractlets linear, filiform from the base of the ovary, 1 or 2; flowers 2, sessile, large; tube of the perigonium truncated at the origin of the limb and always of its length, the segments broadly lanceolate, acuminate, generally very narrow, spatulate, with an apiculum, broadly streaked on the back, the inner ones more obtuse and broader, inserted at the origin of the corona; corona large, broad, longer

than the infundibular part of the perigonium, the lobes broadly but shortly 3-angular, rather acute; filaments exquisitely sinuous, adnate up to the throat of the corona, the free filiform part surpassing the corona; anthers rather small, arcuate, reniforms; style narrowly clavate toward the apex, capitulate, lobulate. Sicily.

Crinum bancanum Kurz, Naturk. Tijdschr. Nederl. Undie *27:* 231. 1864. Bulb. . .; leaves linear, submembranous, subundulate, flaccid, 18 inches long, ¾ inch wide, glaucescent-greenish; scape 12 or more inches long, rather compressed, reddish-green; spathe chartaceous, bifid or split, 10—12 flowered; flowers showy, odorous, the tube 3 inches long, the limb longer, reddened at the base, yellowish-green from the middle, striatulate; segments of the limb 2—2½ inches long, 6—8 mm. wide, linear-lanceolate, incurved-mucronate, subreflexed, white, rose-striate in the middle; filaments and style purple.

Gethyllis campanulata L. Bolus, jour. bot. *67:* 137. 1929. Bulb globose, 4.5 cm. in diameter; leaves in fascicles of 8 to 10, appearing after the flowers, narrowly linear, slightly spirally twisted, 5—7 cm. long above the ground, to 1.5 mm. wide, the margins and nerves sparsely setulose, the setae white; perianth snow-white or rarely suffused on the outside with pale rose; the tube 5 cm. long, 4 mm. wide at the base, 3 mm. wide at the apex; the segments erect, connivent and imbricate, thus forming a bell 3—5 cm. in diameter, oblong-elliptic, acute, 4.3 cm. long, the outer ones to 2.2 cm. wide, the inner ones to 2 cm. wide; stamens 12, arranged in 6 pairs, the filaments of each pair shortly connate at the base, spreading, 6 mm. long; anthers 1.2 cm. long, sometimes spirally twisted, sometimes circinately recurved; style strict, exserted 1.3 cm. beyond the tube, very slightly dilated into a minutely trilobed stigma. Cape Province.

Nerine transvaalensis L. Bolus, Fl. Pl. So. Afr. *18:* sub pl. 691. 1928. Closely related to *N. frithii,* but distinguished by the narrower and shorter perianth segments, the more slender and longer filaments, and the dissimilar appendages. *N. frithii* L. Bolus, in part, before Plate 132.

Nerine angulata L. Bolus, So. Afr. Gard. *20:* 148, fig. B. 1930. Segments of the perianth to 4.3 cm. long; filaments to 3.8 cm. long, appendage at the base; ovary acutely angular, the angles narrowly winged, 7 mm. in diameter from angle to angle; stigma suborbicular, pulvinate, 1.5 mm. in diameter—otherwise very similar to *N. angustifolia.* From a garden, Immelmann (N. B. G. 2056/28).

Hessea leipoldtii L. Bolus, So. Afr. Gard. *20:* 148, fig. c. 1930. Leaves 2 or 3, oblong-oval, densely and softly ciliate, otherwise glabrous, 5.3 cm. long, 2.7 cm. wide; peduncle to 10 cm. long, 9—12-flowered; pedicels at length broadly spreading, 5 cm. long, dilated above; segments patulous, obtuse, to 7 mm. long, 3 mm. wide; stamens to 5 mm. long; style increasing to 5 mm., the base dilated, obtusely subangular; ovary 1.5 mm. in the immature fruit 6 mm. in diameter, with 2 or 3 seeds per locule. Near Olifant's River Dam, Clanwilliam region, April, Leipoldt s. n. (Bolus Herb. no. 19140).

Gethyllis lanuginosa Marloth, So. Afr. Gard. *21:* 41, figs. 1, 2 & 3. 1931. Leaves linear, involute at the apex, very densely lanuginous with

simple hairs; flowers white; stamens 6; style declinate, surpassing the anthers; stigma discoid; berry clavate. Cape Province.

Gethyllis setosa Marloth, So. Afr. Gard. *21:* 41, fig. 4. 1931. Leaves lanceolate, short, erect, very densely covered with scales which are composed of white setae affixed at their center, the lower portion of the scales lacerate, the upper portion solid and directed toward the apex of the leaf; style declinate; stigma oblique-conic. Cape Province.

Gethyllis verrucosa Marloth, So. Afr. Gard. *21:* 41, figs. 5 & 6. 1931. Leaves linear, divaricate, the upper surface and margins covered with flat lacerate scales and red tubercles; style declinate; stigma capitate. Cape Province.

Nothoscordum nudum Beauverd, Bull. Herb. Boiss. ser. 2. *8:* 998, fig. 3-A-C. 1908. Bulb globose, 8—10 mm. in diameter, brown, tunicated, 1-scaped; leaves during anthesis absent; umbel 3—5-flowered; values of the spathe 7—9 mm. long, ovate-lanceolate, acuminate, violet-spotted, striate, shorter than the pedicel; pedicels 1—2 cm. long; tepals 6—7 mm. long, 1—2 mm. wide, elliptic-oblong, acute, subconnate at the base, yellowish-uninerved; filaments 4—5 mm. long, flat, lanceolate-subulate, the alternate ones longer; ovary obcordate, 3 mm. long during anthesis, the locules 3- or 4-ovulate; style 3.5 mm. long, slightly longer than the ovary, surpassing the anthers (which are 2 mm. long); stigmas elongate. Perennial. Camine al Puma, in rocky hills, dept. Minas, Uruguay, April 14, 1906, C. Osten 4689.

Nothoscordum scabridulum Beauverd, Bull. Herb. Boiss. ser. 2. *8:* 1000, fig. 3-D-G. 1908. Bulb globose, 8—10 mm. in diameter, fuliginous, truncate; leaves 3.5—4 cm. long, 1/3 mm. wide, few, very narrowly linear, rather firm, glabrous, striate, rounded at the apex; scape 18—25 cm. long, scabridulous, many times longer than the leaves; valves of the spathe 7—9 mm. long, ovate, acuminate; umbel 2—4-flowered; tepals 5—8 mm. long, 2—2.5 mm. wide, elliptic-oblong, rounded at the apex, subconnate at the base, whitish, yellowish-uninerved; filaments 4—5 mm. long, flat, lanceolate-subulate, unequal; anthers 1.75 mm. long; ovary obcordate, 2 mm. long during anthesis, the cells 8-ovulate; style 3.5 mm. long, surpassing the anthers; stigmas hemispheric. Perennial. In shaded mossy places, Verdun, dept. Minas, Uruguay, April 16, 1908, C. Osten 5199.

Nothoscordum minarum Beauverd, Bull. Herb. Boiss. ser. 2. *8:* 1001, fig. 3-H-M. 1908. Bulb globose, 10—12 mm. in diameter, gray, tunicated; leaves 10—12 cm. long, very narrowly linear, rather thick, canaliculate, flexuous, scabridulous at the base, rounded at the apex; scape 10—18 cm. long, deflexed, glabrous, surpassed by or equalled by the leaves; valves of the spathe 10—15 mm. long, ovate-lanceolate, striate with pale brown; umbel 2—4-flowered; tepals 7—10 mm. long, 2—3 mm. wide, equal, elliptic-oblong, acuminate at the apex, subconnate at the base, yellowish, golden-uninerved; filaments 4—5 mm. long, subequal, flat, linear, narrowed above; anthers 2.25—2.5 mm. long; ovary elliptic-subglobose, 2.5—3 mm. long during anthesis, the cells 6—8-ovulate; style 3 mm. long, slightly longer than the ovary, of a length intermediate

among the stamens or shorter than they are; stigma conic. Perennial. In fields, Arequita, dept. Minas, Uruguay, October 10, 1907. C. Osten 5147.

Nothoscordum grossibulum Beauverd, Bull. Herb. Boiss. ser. 2. *8*: 1003, fig. 5-A-D. 1908. Bulb ovate, 2 cm. in diameter, gray, tunicated, with many scapes; leaves 4—8 cm. long, 1 mm. wide, narrowly linear, striate, rounded at the apex; scape 3—7 cm. long, few-flowered, glabrous, surpassed by or equalled by the leaves; valves of the spathe 11—18 mm. long, narrowly ovate-acuminate, longer than or subequalling the pedicel; umbel 2- or 3-flowered; tepals 9—12 mm. long, 2.5 mm. wide, elliptic-lanceolate, rather obtuse at the apex, subconnate at the base, unequal, whitish, greenish-uninerved; filaments 6—7 mm. long, flat, lanceolate-subulate, subequal; anthers 1.5 mm. long; style 6 mm. long, twice as long as the subclavate ovary, surpassing the anthers; stigma capitate. Perennial. Cerro Verdun, dept. Minas, Uruguay, April 14, 1906, C. Osten 1686.

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EDITED BY

HAMILTON P. TRAUB

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Cover design, by Hamilton P. Traub, based on the forms of un-named hybrid *Narcissus* seedlings produced by Edwin C. Powell—the flower color is not necessarily that of the originals.

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1954

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THE AMERICAN PLANT LIFE SOCIETY is organized for the "increase and diffusion of knowledge concerning plant life," and to carry out its objectives the main emphasis is placed on the publication of PLANT LIFE, the periodical devoted to plant life, incl., HERBERTIA, the issue devoted exclusively to the amaryllids. The publications are international in scope. All paid up members are privileged to receive the current issues of PLANT LIFE, incl., HERBERTIA.

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STYLE. Manuscripts *must be typewritten* and *double-spaced* throughout [using a new heavy black ribbon]. Calculations, figures, tables, names, quotations and literature citations should be carefully verified.

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All persons and organizations interested in amaryllids, and other plants are invited to become members. The annual dues are $3.00 (foreign, $3.50) in advance which should be sent to:

MRS. LYDIA BARNETT, *Membership Secretary*
The American Plant Life Society
3162 Haven Park, El Monte, California

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HERBERTIA

1954

Year Book of
The American Amaryllis Society

SECOND AMARYLLIS EDITION

EDITED BY
HAMILTON P. TRAUB
HAROLD N. MOLDENKE

THE AMERICAN PLANT LIFE SOCIETY
3162 Haven Park, El Monte, California

THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

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I. THE AMERICAN AMARYLLIS SOCIETY

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[THE AMERICAN AMARYLLIS SOCIETY—continued on page 133.]

PREFACE

This second Hybrid Amaryllis edition of HERBERTIA, the 20th issue, is appropriately dedicated to Thomas R. Manley, who received the 1954 HERBERT MEDAL for his outstanding contributions in the field of evaluating vegetatively propagated Amaryllis clones, and methods of forcing them into bloom for show purposes. Besides the charming autobiography, Mr. Manley contributes three valuable articles in his special field—the evaluation of Amaryllis clones, problems in evaluating and merchandizing Amaryllis, and the forcing of Amaryllis for exhibition purposes.

As usual, there is a wealth of amaryllis lore in this 20th Anniversary edition.

There is a revision of the Divisions of cultivated Amaryllis; and an article on the personal evaluation of hybrid Amaryllis by Dr. Thornburgh. There are articles on the McCulloch hybrid Amaryllis by Mrs. Strout and Mrs. Anderson; the growing of Amaryllis by Mr. Spies (Illinois), Mrs. Morton (Louisiana), and Mrs. Evans (Louisiana); the Cammack and Sangster hybrid Amaryllis by Mr. Hayward; the use of spaghnum in Amaryllis culture and troubles of an Amaryllis importer by Mr. Hayward; Amaryllis in flower arrangements by Dr. Corliss; experiences in propagating Amaryllis by Mr. Weisner; Amaryllis pests and their control by Dr. Smith; and the Broad Mite of Amaryllis by Mr. Burlingham.

The other amaryllids are not neglected in this issue. There are reports on the 1954 New Orleans and Mobile Amaryllis shows, and the 14th Central Florida Daylily show. There are articles on a new *Crinum* species from South Africa; Texas Alliums, and collecting *Zephyranthes* in Mexico by Lt. Howard; daylily evaluation by Prof. Saxton; daylily inheritance data by Prof. Ballard; early blooming Narcissus by Dr. Cooley; and Crinum moorei forms by L. S. Hannibal. Other contributions include Amaryllid notes by H. P. Traub; Amaryllid genera and species by Dr. Moldenke; and registration of New Amaryllid clones.

Miss Pauline Buck, who had served as Membership-Secretary since January 1, 1953, was married to Mr. Charles J. Turner, Route 1, Box 24, Fort Bragg, Calif., in March 1954, and therefore she tendered her resignation on March 24, 1954, in order to devote her time to the vocation of home-making. We are certain that we speak for the membership in thanking Mrs. Turner for her efficient service in the interests of the Society during her term in office, and in extending all good wishes for her happiness in her new role as home-maker.

Mrs. Lydia Barnett, 3162 Haven Park, El Monte, Calif., an enthusiastic gardener, interested in amaryllids and other plants, accepted the position of Membership-Secretary on March 24, 1954.

The 1955 issue of Herbertia will be dedicated to Dr. Robert F. Hoover, of San Luis Obispo, Calif., who cleared up the naming of the BRODIAEA LILIES—*Brodiaea*, *Dichelostemma*, *Triteleia* and *Triteleiopsis*.

In the past, the naming of these beautiful plants had been confused so that different names for the same species were often used. Dr. Hoover's work has remedied this condition. As is customary, articles on Amaryllis and other amaryllids are needed for this issue, and should be sent in to the editor as soon as ready—by September 1, 1954 if possible—in order to insure early publication.

1531 Rodeo Road.
Arcadia, California
March 29, 1954

Hamilton P. Traub
Harold N. Moldenke

[PLANT LIFE LIBRARY, continued from page 132.]

MITOSIS—THE MOVEMENT OF CHROMOSOMES IN CELL DIVISION, by Franz Schrader. 2nd ed., Columbia Univ. Press, 2960 Broadway, New York 27, N. Y. pp. 170. Illus. $4.00.

The marked increase in the number of publications dealing with mitosis since 1944, has necessitated the publication of this second edition. The treatise deals with "karyokinesis or mitosis in the old (and correct) sense—a division of the nucleus that involves the spindle apparatus. As such it includes meiotic mitosis but not cytokinesis". The book is divided into five sections—(1) Introduction, (2) Structure—living cells, fixed cells, the actuality of structural elements in the spindle, and the nature and origin of the spindle apparatus. (3) Hypotheses of mitosis. (4) Related problems—resting stage, pairing, telomere, heteropycnotic attraction, kinetochore attraction, the nuclear membrane, and the pre-metaphase stretch, and (5) Conclusion.

This concisely and clearly written book is of interest to the biologist, cytologist, embryologist, geneticist or physiologist, and is an indispensable addition to his library.

GROWTH AND DIFFERENTIATION IN PLANTS, edited by W. E. Loomis. Iowa State College Press, Ames, Ia. 1953. Pp. 458. Illus. $7.50.

In this monograph of the American Society of Plant Physiologists, the authors and topics "have been chosen to give a rounded and thorough coverage of . . . a complex field"—Growth and Differentiation in Plants. The contributions include the Introduction by W. E. Loomis, Plant morphogenesis, by E. W. Sinnott, Growth of the root-tip by G. B. de la Pena, Elongation of the cotton fiber, by J. C. O'Kelley and P. W. Carr, Anatomical differentiation in shoot and root axes, by Katherine Esau, Some elementary mathematics of plant growth, by R. E. Buchanan, Heterosis, by G. F. Sprague, Dormancy, by N. C. Thornton, Reactions of plants to photoperiod, by A. W. Naylor, Vernalization of growing plants,

[PLANT LIFE LIBRARY, continued on page 17.]

Dedicated to
Thomas R. Manley, M. S.

Herbert Medalist—Thomas R. Manley, *M. S.*

Plate 1

THOMAS ROY MANLEY, M. S.

An autobiography

One often ponders as to why he has chosen a certain profession when the range of selection is so very wide and the rewards vary from a meager livelihood to one of great sums. For me it seems that I was predestined to be an horticulturalist for my entire life has been associated with plant growing and the companionship of those whose interests were similar to mine.

My mother, a flower loving farm girl of Dutch and Amerindian ancestry was raised on the fertile plains of the Susquehanna Valley in Pennsylvania. My father, a civil engineer, was raised on a farm in the rolling hills of West Virginia. Only when his college days were over did he move to the industrial areas surrounding Pittsburgh, Pennsylvania where I was born on June 15, 1918 in McKeesport, Pennsylvania. Tragically, my father died when I was seven. Mother, sister and I then moved to Fairmont, West Virginia where as a youth I possessed great desire to study plants and endeavored to grow them to perfection in a small back-yard garden. My grandfather was the head gardener on the estate of Col. Kimble White, one of the great coal producers of West Virginia. It was on the White estate, under his keen eye and typical English methods of horticulture, that I learned the fundamentals of growing and caring for plants. Mrs. White's garden was the envy of the city and the pride of my grandfather's life in his late years. Well do I remember his growing the first delphiniums—Blackmore and Langdon strains—in the city, with spikes six and seven feet tall. Well, too, do I remember the hours spent freeing the lawn of dandelions, raking leaves and spading in manure and bonemeal while a most interesting football game was in progress a block away.

When high school days crowded away my hours of leisure, spent working in the garden, I studied with great enthusiasm biology and chemistry, winning the award given annually to the best student in biology. The summers were spent caring for lawns and flower gardens in the neighborhood. Our home garden—the best in the community—was always the center of attraction as each crop of flowers bloomed. In 1937, a very good friend and neighbor whose garden I cared for, Dr. Paul Musgrave, world authority on the Coleoptera Family of Insects, moved from our town leaving me his famous iris collection which included 'San Francisco,' 'Purissima,' 'Ramases,' 'Mary Geddes' and numerous other fine iris of that time. These were moved to the Manley garden and my first attempts in hybridization were made. Many thousands of seedlings have resulted from these and later crosses. Many were outstanding but were lost during my four years in the military service during the war.

My first attempts at exhibition were in 1938 when I displayed stalks of iris in the local flower show then dominated by the wife of a leading politician in our State. How well do I remember the indignation of the

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ladies when a college freshman exhibited iris that were far superior to those of the ladies of the "fourth estate" so to speak. Judging, as it so often happens in small shows, was based on personalities who entered the varieties rather than on the variety itself so I lost to 'Lord of June', the perennial favorite of the before mentioned lady. It taught me a great lesson, one I have never forgotten as I have studied and worked for the fair evaluation of ornamentals ever since.

The year 1937 was perhaps the most crucial one in my life for during that year I made certain decisions that have affected my entire life. As a freshman working my way through college, I had to decide on a career. My mother had hoped I would become a surgeon or physician. others a geologist while within me I felt a college teaching career as a botanist would fulfill my ambition.

It was my good fortune to be assigned to work for Professor C. M. Roberts as a biology laboratory assistant, which as a freshman amounted to cleaning up after classes and collecting plant material for classes. This I enjoyed immensely and through it I became acquainted with "Prof." Roberts who, aside from his teaching of biology and botany, collected mosses as a hobby. I accompanied him on many field trips and he became my very good friend. It was at his suggestion that I chose a flower to grow as a hobby and thus I became a gladiolus hobbiest. His interest in me and all his botany majors made "Prof." Roberts one whom one could rely on for advice and knowledge. His easy going mannerisms and unselfish loyalty to his pupils has made him a friend to whom I go quite often for advice.

My first gladiolus were purchased from Mr. Elmer Gove, Champlain View Gardens, Burlington, Vermont in 1938. This is the firm of which I am now a partner and production manager. These gladiolus grew so well that I rapidly became a fancier and exhibitor. In order to have a gladiolus show near home a few other gladiolus fanciers and I formed the West Virginia Gladiolus Society in the fall of 1938. This organization held its first show in Grafton, West Virginia in August 2-3, 1939. This show has grown from one in a small store-room to one of the nation's highest quality shows. The leading exhibitors of Ohio, Pennsylvania, Maryland, Virginia, Kentucky and New York annually display their spikes in the huge Pine Room at Oglebay Park, Wheeling, West Virginia. As secretary, 1938-1941, and President, 1945-1949, with a wonderful team of cooperative growers, we have endeavored to make the West Virginia Gladiolus Society one of the nation's finest. Its shows, trial gardens, 1939 to 1942 and 1946 to 1949, and the active participation of its members in the gladiolus council and other neighboring state society activities attest to the success of this organization.

My first experience with testing plants came in 1938 when I assisted Dean Oliver Shurtleff, noted dahlia authority, with the American Dahlia Society Test Garden in Fairmont. The following year, 1939, the West Virginia Gladiolus Trial Garden was established under my supervision. This test garden was in operation until 1942. It was disbanded during the war but was re-established in 1946. As secretary of the West Virginia Gladiolus Society I soon became a member of several commit-

tees of the New England Gladiolus Society, especially the trial garden and classification committees. I participated in the Hartford and Poughkeepsie conferences on gladiolus classification and championed the size-color classification now used for gladiolus.

As a graduate student at West Virginia University I worked extensively on the various materials and methods of breaking the dormancy of gladiolus corms and cormels, colchiene treatment of gladiolus cormels, developed much of the research on the use of lysol as a pre-planting dip, and soil reaction studies on gladiolus corm production. Many articles were published from this work in leading horticultural magazines. My thesis for the Master of Science (M. S.) in Genetics was on the Origin of the "Tangerine Beard" in Iris, a most interesting study of the breeding trends in the development of a pink iris.

Early in 1942, the war interrupted any further graduate work. The next four years were spent in the air force where I worked on conservation control on a large proving ground in southern Indiana. I persuaded the enlisted men on the post to grow a large garden and several acres of potatoes to supplement the mess fund.

For several seasons we were quite successful raising several thousand dollars worth of produce each year. One year our potato crop was the record for the county. For this activity I was awarded two commendations by the Commanding General of the Proving Ground Command. I further served as a Horticultural Specialist on claims of damage by farmers whose crops were damaged by falling planes or other army activities.

With evenings of leisure I became associated with three men who wanted to form a gladiolus organization for growers and amateurs of the United States and Canada. I agreed to be the temporary secretary and contact interested parties in behalf of the organization. There appeared a great need for such an organization as there were many gladiolus societies working as individuals who were endeavoring to solve problems that affected the entire gladiolus industry. The New England Gladiolus Society was endeavoring to solve these problems. However, much dissension existed and prejudiced persons prevailed and progress was stopped temporarily.

Well do I remember the evenings spent writing letters long-hand to hundreds of interested persons requesting ideas and formulating plans. I spent a great deal of time drawing up a constitution which I hoped would weld the societies together for the benefit of a great industry. Fortunately many of these ideas worked and when a meeting was called on January 17, 1944 in Detroit, Michigan there emerged from it the North American Gladiolus Council with 18 affiliated societies. Today over 63 societies are working with this organization which directs the gladiolus activities of the nation. Its achievement Award, a beautiful bronze plaque, presented each year to the outstanding gladiolus personality has been given to many deserving, tireless workers of the gladiolus industry. A dream of mine come true. As first Secretary of the Council, 1944 to 1947, I aided its beginning and have continually

worked for its betterment. Upon retiring from office to complete my graduate work in 1948, I was awarded the first Gold Medal of the N. A. G. C. for distinguished service to the organization.

In the summer of 1945 I was transferred by the Army Air Force to California where I worked in the food distribution department of a large army base. This enabled me to procure many kinds of fruits and vegetables purchased by the base. I also had many opportunities to visit the vineyards, orchards and fields where these food products were grown. Fascinated by the lush semi-tropical growth, I spent many weekends visiting leading horticulturalists of the West coast. Carl Salbach, Sydney Mitchell, Frank Reinelt and many others provided me with an abundance of information. Visits to the Redwood and Sequoia forests were equally inspiring as were visits to the canneries and packing houses of figs, dates, raisins and other dried fruits. Until my discharge in December 1945 my army life provided me an education in horticulture because I took advantage of every opportunity to study the cultivated plants of that particular region.

My college sweetheart, a farm girl, majoring in Home Economics, Evelyn Snoderly and I were married in 1943 in Indiana. Her great love for plants and outdoors has been a great aid in my horticultural progress. Our two children are growing up amid the myriad of objects a plantsman must have. Long walks with their mother have familiarized them with many animals, birds and plants in the fields and forests. Helping her father in the garden has enabled the five year old daughter, Natalie Anne, to hybridize iris, lilies, gladiolus, and to emasculate and pollinate amaryllis in the greenhouse or window garden. Full explanations are made by this little lass to any inquiring new-comer not familiar with plant breeding. My son, Carl Lance, at the age of four was observed instructing a new gladiolus amateur visiting our garden at planting time in the procedure necessary to remove the husk and de-eye gladiolus corms; and reminding the fellow to wash his hands as soon as he finished as there was DDT on the corms for thrips control and that it made one ill to get it in one's system. Like plants their mother has carefully nurtured them with the abundance of beauty and wisdom of the outdoors. Surely one of these children will follow his father's footsteps.

Spring 1947 found the Manley's living in Oglebay Park, Wheeling, West Virginia where I was floriculturist of the Wheeling Park Commission and Director of the Wheeling Garden Center. Many noteworthy activities transpired in Wheeling to enhance my horticultural career. The Garden Center developed a garden for testing hundreds of new varieties of flowering annuals, bulbs and corms. The task became so great I asked Professor R. F. Marsh, Head of the Dept. of Horticulture, West Virginia University, if there were not some students in his classes interested in ornamentals. As a graduate of the University I knew no classes were offered in floriculture or ornamental horticulture. However, the thought occurred to me there might be students there whose interests were similar to mine and fortunately there were,—eight of them. These students were enrolled in a sum-

mer ornamentals course outlined by Dr. Marsh and myself and classes were held at Oglebay Park. Thus, the test garden was carefully nurtured and records taken. The greenhouses were also used for class work and an annual chrysanthemum show was revived with over 3,000 8-inch pots of giant chrysanthemums on display the first season. The following season another group of students came to Oglebay Park and from this small beginning a new department was established at the University. At present it has two fine young horticulturists, one on woody ornamentals and the other on greenhouse crops to instruct the growing classes in floriculture. Its nationally known lily research work in conjunction with the United States Department of Agriculture forms a vital part of the research now being conducted by that Department.

In the Fall of 1947 we formed the Men's Garden Club of Wheeling. I was the first Secretary and Program Chairman. This group soon had over seventy members with monthly meetings and an annual flower and garden show. Members of this organization have taken an active part in the regional and national activities of the Men's Garden Club of America.

The Garden Center continued to grow in membership and in the scope of its activities. Most of all the test garden grew in size, variety of plants evaluated, and scope, bringing many leading hybridists to view the plantings and study the material there. This further emphasized the need for a series of national trial gardens.

In 1949 I received a scholarship from the Ohio Florists Association to work on my Ph.D. in Floriculture under world renowned Prof. Alex Lauire at Ohio State University. Reluctantly we moved from beautiful Oglebay Park with its acres of rolling hills covered with over 100 varieties of trees to an army type housing project on the fringe of the campus in Columbus, Ohio.

My research was a nutritional study of gladiolus and amaryllis which progressed well during the winter. However, I was continually being offered very promising positions in the horticultural field. Three of the leading garden magazines offered me garden editorships and a large national seed company offered me the position of head of its bulb department. These dazzling plums were quite tempting, making my thoughts wander from research but not quite enough to abandon it. However, that day did soon arrive when Arnold Davis, one of America's leading horticulturists offered me a position as head of the Dutch Elm Disease Program in Cleveland under the sponsorship of the Garden Center of Greater Cleveland. To work with Arnold Davis was something I had never dreamed of. A chance to do something greater than all my research would ever bring was in the offing. So, early in April we moved to Cleveland and I waded into the program of educating the people of Cleveland in methods of combating the dreaded Dutch Elm disease.

Working with Arnold Davis, a man who does a dozen things well at once, I soon acquired that habit and together with the support of the Garden Center and the Biology Department of Western Reserve

University we developed a series of activities operating under the title of the Valleevue Trial Gardens.

Valleevue, a 300 acre farm substantially endowed and bequeathed to the University by a wealthy benefactor was ideally situated to planting of large acres in horticultural crops. Twelve years of inactivity at the farm was soon ended by the varied plantings of iris, gladiolus, hemerocallis, liliums, roses, delphiniums, chrysanthemums, dahlias, tulips and many other types of flowers. Over 2100 different varieties of these plants were grown and evaluated each season. Material was submitted for trial from Europe, Australia, New Zealand, Canada, South Africa and the United States.

From its very beginning the garden displayed the importance of such a project in the United States. Aside from the beauty and display value of the planting for garden lovers in Cleveland and the surrounding areas it became the center of research on garden flowers. Mr. Davis and I organized many interested groups which became small plant societies such as the hemerocallis and iris growers in Cleveland. local flower societies took an active participation in the project caring for the various gardens and supplying judges for evaluation of the many varieties. The Cleveland and Forest City Rose Societies, Ohio State Gladiolus Society, the Ohio Dahlia Society are typical. National plant societies as The Hemerocallis Society, North American Gladiolus Council, The North American Lily Society and others designated these plantings as regional trial gardens.

My great desire for the adoption of uniform standards of show judging and field evaluation caused me to form an annual judging school of the Ohio State Gladiolus Society followed by the Ohio Dahlia Society with its judging school.

Research has always fascinated me and with the wealth of material at hand I carried out many experiments, namely, a three year mulching experiment, using many organic materials, plant nutrition work on foliar fertilization, temperature studies of mulches and cultured techniques for forcing amaryllis and gladiolus. Numerous flower shows were held in conjunction with the trial gardens. The Garden Center also served as the meeting place for small national plant societies. In 1950 The Hemerocallis Society, 1951 The American Peony Society, 1952 The North American Lily Society and in 1953 The North American Gladiolus Council held meetings in Cleveland.

Trial gardens are exhaustive to a staff regardless of of size. Many periods of bloom would bring up to 5000 persons to view the plantings. To say the trial garden became a mecca for garden clubs is putting it mildly. The trial garden each year grew in size and scope of activities with the Garden Center of Cleveland placing all possible funds to its disposal. However, it became too big for the University to handle its portion of the activities and due to pressure exerted by certain staff members the project was doomed to abandonment.

The trial garden had brought me in contact with many persons who offered me positions of many kinds, however, my great love of gladiolus and the world-wide prestige of Champlain View Gardens

caused me to leave Cleveland and the project Mr. Davis and I cherished so much came to an end.

In the Fall of 1951 I was awarded the Silver Medal of the Men's Garden Club of America for Distinguished Service in Horticulture and the Fostering of Better Methods of Plant Evaluation. At that particular time my trial garden activities had caused me to hold the following offices in plant societies. President of the Ohio State Gladiolus Society, Vice President of the North American Lily Society, Regional Director of the Hemerocallis Society, Chairman of Trial Gardens of the North American Gladiolus Council, Accredited Judge of the American Iris Society and The Hemerocallis Society, Vice President of Chagrin Falls Men's Garden Club, and Chief Tester of the Men's Garden Club of Cleveland.

Moving to Burlington, Vermont to assume the responsibility of caring for 100 acres of Gladiolus corms, plus the flowers that are cut by the 1000 dozens during August and September is a great challenge—one I enjoy. Time can be found to grow several acres of seedlings each season resulting from hundreds of crosses. The opportunity to display gladiolus grown to perfection throughout the eastern portion of the United States increases the delights of my new occupation. In the greenhouse are my priceless amaryllis bulbs. Each season additional varieties are added for evaluation from the best growers in Holland, Australia and America.

In the fall of 1952 my second gladiolus honorary award was received—the Gold Medal of the New England Gladiolus Society, for many contributions to the betterment of the gladiolus, research, trial gardens, cultural techniques and contributions to the literature on gladiolus.

At this time we are forming a new gladiolus society in Vermont with many interested persons enrolling to make the Vermont organization a most active one.

Amaryllids usurp Gladiolus

One, no doubt, wonders why an organization as The American Amaryllis Society, which is affiliated with The Plant Life Society would bestow its coveted William Herbert Medal on a man who had worked on gladiolus for most of his life. But I must confess that although I have worked long with gladiolus and still do, this does not mean that I am less interested in Amaryllis.

I always have an excellent collection of narcissus in the garden and *Amaryllis* x *johnsonii* as a pot plant in my room. I likewise was a student and friend of Dr. Leon H. Leonian, breeder of red hemerocallis and world renowned delphinium hybridizer. I assisted him in the greenhouse at West Virginia University with the germination and transplanting of thousands of hemerocallis seedlings. I learned much from his casual remarks concerning many types of flowers. The great day came when William Dieckmann imported 50 Van Meeuwen Superiora Amaryllis from H. DeGraff & Sons, Lisse, Holland. These bulbs

were given to me to grow and enjoy. In 1946 few people in the North grew amaryllis and fewer still had ever seen the 8- to 10-inch wide flowers that these varieties could produce. When they were in full bloom I held a show in the Garden Center at Wheeling, West Virginia. Those in attendance were spell-bound on seeing the size and dazzling colors of these clones which I was soon to realize were below average in comparison with the excellent named clones available today.

Careful rogueing of these varieties reduced their number to eight which I have grown for six years. These made me an amaryllis fancier and I boast with joy of having one of the finest collections of named varieties available anywhere.

In 1949 through Ludwig & Co., Hillegom, H. DeGraff & Son, Lisse, and P. J. Komen, representative for W. S. Warmenhoven & Son, Lisse, Holland, I was able to obtain practically all of the named Dutch amaryllis clones for a comparison trial test at Valleevue. The collection amounted to over 400 huge bulbs. Realizing the great beauty this collection would possess, Mr. Davis and I decided to enter them as a 500-foot display in the Cleveland Flower Show. The uniqueness of the display and the perfection of the flowers made it the highlight of the spring show. Thousands of bulbs were sold by various stands at the show. A repeat performance in 1950 presented a more elaborate display with greater interest than we anticipated. From it Cleveland and northeastern Ohio became Amaryllis conscious.

Unknown to me at the time was the great interest our trial garden reports on Amaryllis were creating throughout the nation. Articles in leading magazines flooded us with letters as to the source of these bulbs and, to my surprise, the growers in Holland were sold out. In some instances they shipped undersized bulbs much to my regret. The trial garden plus the reports published throughout the world established the Dutch Hybrid Amaryllis as a product without a peer and gave the American flower loving public a brilliantly colored new flower for the home.

I am continuing the evaluation of amaryllis for the Dutch hybridists, enabling them to receive a report each season on the new seedlings they deem worthy of introduction. A report will be made annually in "Herbertia".

My garden contains many of the finest hemerocallis varieties in existence. Each season I await with great anticipation the opening of each bud heralding another period of brilliant color in the garden. Although a gladiolus grower by profession, my love of amaryllis, iris and many other flowers will keep my garden and greenhouse, as well as my pen, alive with stories of the ever-increasing numbers of new flowers that appear. At 34 I am only beginning what I hope to be a long life time of study, research and enjoyment from flowers.

EVALUATION OF VEGETATIVELY PROPAGATED AMARYLLIS CLONES

THOMAS R. MANLEY, *Vermont*

The Valleevue Trial Garden established a comparison trial method of evaluating named varieties of amaryllis. Most of the flowers on trial were evaluated according to established score sheets. However for amaryllis evaluation the committee recommended a comparison evaluation method. Since the collection contained all of the named clones available for sale in Holland it was obvious that no clone superior to those on trial existed there with stock sufficient for introduction.

As each variety bloomed its color value was carefully determined by the color classification committee. The factors considered for evaluating color are saturation, depth, color harmony, defects in color such as flecking, fading, feathering of color and peeling of color.

Substance and texture of the flowers were noted—data was collected on the lasting quality of the flowers as well as the physical quality which ranges from soft or thin to heavy or thick.

Form of the flowers was studied as well as the number of flowers per scape. Refinement and balance of the flowers in regard to the size and height of the scape was particularly noted. Heavy scapes with small sized flowers were penalized as the coarse scape destroyed the gracefulness of the plant.

Flower size was measured and checked each season for three years for an average dimension. Although size is not always a factor clones with large flowers—nine to twelve inches, were usually found on scapes that contained but two flowers, a definite disadvantage as a larger number of flowers per scape is desirable for increased length of blooming period and greater display value. Public choice of varieties tends toward clones with seven to eight inch flowers. Smaller flowers were not acceptable unless the color pattern was unusual. The public is seeking large flowers in spectacular colors which even under poor culture will produce flowers of acceptable size when compared with American field grown hybrids.

A study of color preferences showed the public to favor light and medium red as the most desirable color with white and scarlet as second, red and white striped third, followed by salmon, rose and pink. New blends such as 'Bouquet' (Ludwig), will no doubt change this color trend.

The final factor in the evaluation of the plant was vigor particularly in regard to heavy leaf growth, response to forcing and recovery from forcing. This was based on two seasons of forcing plus two seasons of normal growth under ideal conditions.

All data was carefully studied and compared before ratings were assigned to each clone. The letter rating of AA—Superior; A—Excellent; B—Good and C—Fair or discard, was given to each clone. The

letter rating was made annually for three seasons with the average rating designated as the permanent rating at the end of the third season. Reports may be found in Plant Life, Vol. 7, 1951, pp. 71-76; Vol. 8, 1952, pp. 70-74 and Vol. 9, 1953, pp. 41-46.

The clones rating highest in each color based on three years' testing were saved to be used as a comparison check for new clones received each year from Holland. These clones are:

Salmon:—'Queen's Page' (Warmenhoven); clean salmon, two scapes, twenty inches tall with 4, eight inch blooms.

Scarlet:—'Halley' (Ludwig); clear, frosty scarlet of great substance and growth, three scapes, twenty-two inches tall with 3 to 4, eight and one-half inch blooms.

Light and medium red:—'American Express' (Ludwig); huge clear red blending deeper in the throat; excellent substance, two to three scapes, twenty-eight inches tall with 4, ten inch blooms.

Dark and wine red:—'Red Master' (Warmenhoven); deepest wine or rose red amaryllis, huge florets usually two to three per scape, color excellent, two scapes twenty-four inches tall with two to three, eleven to twelve inch blooms.

White:—'Queen of the Whites' (Warmenhoven); glistening waxy pure white with faint tinge of green in the throat; two to three scapes, twenty-five inches tall with 4 to 5, nine inch blooms.

Rose, pink and striped varieties need considerable improvement to receive high ratings. Several new varieties on trial show merit in these colors and may be included after they have been tested three seasons.

The outstanding new named clones are—

'Cherokee' (Warmenhoven); clear sparkling metallic red with orangy cast; excellent substance, two scapes, twenty-six inches with 4, eight inch blooms. Rating 1953—A.

'Red Majesty' (Warmenhoven); huge very broad segmented red with a frosty sheen, excellent substance, foliage a reddish tinge, two scapes, twenty-four inches tall with 4, ten inch blooms. Rating 1953—AA.

'Royal Ruby' (Warmenhoven); brilliant clear medium red, excellent substance, two scapes twenty-eight inches tall with 4, nine inch blooms. Rating 1953—A.

'Beacon' (Warmenhoven); deep frosty salmon with clean well defined three-fourth inch band of glistening white down the midrib of each segment; two scapes, twenty-six inches high with 4, ten inch blooms. Rating 1953—AA.

'Wyndham Hayward' (Ludwig); Exceptionally clear rich red with a frosty sheen, self color. Two scapes, twenty-two inches tall with 4, nine inch blooms. Rating 1953—AA.

'Ludwig's Masterpiece' (Ludwig); brilliant light red slightly deeper red at the base of segments; two scapes, twenty-four inches tall with 4 to 5, seven inch blooms. Rating 1953—A.

'Bouquet' (Ludwig); the most beautiful blend of salmon and pink one can imagine. This huge blend has great substance and a frosty lustre; fades imperceptibly as it ages which increases its beauty; two

scapes, twenty-two inches tall with 4, seven to eight inch florets. Rating 1953—AA.

Many others are being evaluated but their performance does not merit a rating at this time.

[PLANT LIFE LIBRARY, continued from page 4.]

by H. C. Thompson, Growth correlation, by W. E. Loomis, Electric fields and correlation in plants, by H. F. Rosene and E. J. Lund, Physiology of hormone action, by S. A. Gordon, Hormonal control of flower initiation, by J. Bonner and L. Liverman, Structure and synthesis of protoplasm, by H. S. McKee, Cellular differentiation: an experimental approach, by B. Commoner and M. L. Zucker, Some factors associated with diseased growth in plants, by A. J. Ricker and A. C. Hildebrandt, and Comparative physiology of heterotrophic growth in plants, by S. H. Hutner.

Valuable bibliographies appear at the end of the articles, and there is a subject index. This is one of the most stimulating books that has appeared recently in the field indicated, and is indispensable to the plant physiologist, geneticist, plant pathologist, or agriculturist.

LIFE OF THE PAST—AN INTRODUCTION TO PALEONTOLOGY, by George Gaylord Simpson. Yale Univ. Press, New Haven, Conn. 1953. pp. 198. illus. $4.00.

This concise adequately illustrated and easily readable text on the science of reading the record of life (palentology) was written by an outstanding authority on the subject for the general reader and the beginning student. The topics discussed include—a walk through time, the remains of ancient life, fossils and rocks, fossils as living things, ancient communities, fossils and geography, the diversity of life, life and time, ways of organic change, theories of evolution, and fossils and mankind. The appendix is in the nature of a broad review of the forms of life "to show how varied it is and, in a general way, what the different forms are like".

This is by far the best book that has appeared on the subject treated for the general reader, and beginning student which can also be read with profit by the advanced student. It is very highly recommended.

[PLANT LIFE LIBRARY, continued on page 110.]

The Queen of the Official Amaryllis Show of New Orleans, 1953, Miss Charmaine Thompson, is crowned by Commissioner Victor H. Schiro. Photo The Times-Picayune-New Orleans States.
Plate 2

1. REGIONAL ACTIVITY AND EXHIBITIONS

NEW ORLEANS AMARYLLIS SHOW, 1953

Mrs. W. D. Morton, Jr., *Chairman,*
Official Amaryllis Show, New Orleans

On March 21st., the doors of the McMain Junior High School Auditorium were opened to the Fifth Official Amaryllis Show of New Orleans, sponsored by the Garden Circle Garden Club. The co-operation of the forty-one Garden Clubs has made the Official Amaryllis Show one of the largest and most outstanding Flower Shows in New Orleans. The color scheme of the Club (Jade green and silver) was carried out in every detail, and made a beautiful setting for the various colors of Amaryllis.

The Show was Judged by twelve accredited Judges. Three Gold Cups, and five American Amaryllis Society Awards, and numerous other gifts were awarded. Mrs. Charles Deal of the Ponchartrain Garden Club, received the Gold Cup on artistic arrangement, Mrs. W. D. Morton, Jr., of the Garden Circle, the Gold Cup on Horticulture, and Miss Jean Griffith, of the Lakeview Junior Club, the Junior Gold Cup. The McMain Junior High School received the Gold School Cup donated by the Garden Circle.

The Mayor proclaimed Amaryllis Week.

The real event of the Show was the crowning of the Official Amaryllis Queen, Miss Charmaine Thompson by Commissioner Victor H. Schiro (Plate 1). Her Court consisted of eight little girls as ribbon bearers, forming an aisle for the Maids and Queen. Miss Phyllis Masscotte, last year's Queen was back to present the Maids—Miss Sandra Montalbano, and Miss Carol LeCompte, the Crown bearer, the Flower girl and last the 1953 Queen.

Mrs. W. D. Morton, Jr., was Chairman of the Show, and Mrs. M. M. Sanchez is President of the Garden Circle.

MOBILE AMARYLLIS SHOW, 1953

Mrs. Herbert J. Johnson, *Co-Chairman,*
Mobile 1953 Amaryllis Show

The Amaryllis Society of Mobile held its initial Amaryllis Show, March 28-29th in the Murphy High School cafeteria. This was a standard competitive show including five divisions, horticulture, artistic arrangements, educational, collector's corner and commercial exhibits. One invitational class was open to garden clubs only and was well filled. Competition was open to all amateur growers in the other classes, membership in the Society was not a requisite. The show was open to the public without charge—hundreds took advantage of the opportunities offered.

Mr. Ernest Thublin, flower Show chairman, with the splendid co-operation of his co-workers, staged an outstanding show. To undertake a big show after having been organized for only one year took courage as well as ability and hard work, all three of which this committee proved to have in abundance.

Our objective in staging this show was to stimulate more interest in growing and arranging hybrid Amaryllis, to acquaint gardeners with other members of the Amaryllis family. Keeping in mind always that all flower shows should be both inspirational as well as educational, we gave our show the theme, "Meet The Amaryllids", including classes that would bring into our show any plants or bulbs of this family. The educational exhibits were outstanding.

First, second, third and fourth place ribbons were given in all classes where merited, and seven large silver trophies were awarded for sweepstake and special awards. These were all new trophies, and therefore most of them were presented by the donors to the winner in impressive ceremonies after the six accredited judges had judged the show.

Mr. Lou Costa, editor of "Progressive Gardening" for the Mobile Press-Register, and Organizational President of this society had urged through his column that all interested in securing free amaryllis seeds should bring a self addressed stamped envelope to the show. He explained that as soon as seeds were available, these envelopes containing seeds would be mailed back to them. Envelopes were also available at the show for the forgetful ones. This proved successful beyond expectation—thousands taking advantage of this offer. Many amaryllis should be added to Mobile's floral beauty because of this one idea. Our second annual Amaryllis Show will be held in the same building on March 27-28, 1954.

14th CENTRAL FLORIDA HEMEROCALLIS SHOW, 1953

Mrs. G. B. Knight, Sr., *Florida*

The fourteenth annual Central Florida Hemerocallis Show was held in the Lodge at Mead Botanical Garden, Orlando-Winter Park, on Sunday May 3, 1953. Both in number of blooms exhibited and number of individual exhibitors, it was the largest ever held. A greater number of visitors attended the show than ever before coming from all over Florida.

More than 700 blooms were on display including more than 250 named varieties representing a large number of hybridizers from all over the United States, and unnamed seedlings of local exhibitors.

Mr. Ralph Wheeler, of Winter Park, exhibited about 100 of his own hybrids, including both named and as yet unnamed ones. Of the named varieties, six were shown for the first time: 'Concordia', Platinum Blonde', 'Arla', 'Sequin', 'Paprika' and 'Annie Oakley'.

Mrs. Bright Taylor, of Ocala, entered 40 blooms, some already introduced, some unnamed seedlings, and four which were new: 'Norma Borland', 'Quincy', 'Celebrity', and 'Moongleam'.

Mrs. C. M. Slaughter of Orlando entered three new introductions: 'Ruth Bayless', 'Susan Wynn' and 'Lucile', and many others of her seedlings.

Mr. and Mrs. G. B. Knight of Apoka had one new daylily: Alice Wherrette. They also showed about 25 of their own seedlings and a number of named varieties of Dr. Stout, Mrs. Bright Taylor; Mr. Wheeler, Nesmith and Lester.

Mr. Kenneth Soper of Orlando showed nearly 100 blooms representing daylilies from Russell, Sass, Stout, and Wheeler.

Mrs. Robert Wall of Clarcona showed a large number of Mrs. Lester's daylilies, some of Mrs. Bright Taylor's and some of Mr. Wheeler's besides a large number of her own seedlings.

Mr. and Mrs. Elvin Speede of Apoka, showed numbers of their seedlings. Mr. Frank Vasku entered an excellent collection of his unnamed hybrids. Mrs. Mary J. Scobie showed a number of named hybrids from several hybridizers and a collection of her own seedlings. Mrs. Carol Harrell of Lake Mary entered a splendid display of named daylilies from a number of different hybridizers.

The Mr. and Mrs. Garden Club sponsored the show, and furnished hosts and hostesses during the entire day.

NATIONAL BOTANICAL GARDEN OF INDIA

Word has been received that Sydney Percy-Lancaster, retired from service after fifty years as Secretary of the Royal Agri-Horticultural Society of India at Calcutta, and that he is now engaged by the Government of India as Senior Technical Assistant in the National Botanical Garden of India. He is interested in building up the collection of ornamental plants in the Garden, and would be very grateful to the members of the American Amaryllis Society, and the American Plant Life Society, with which it is affiliated, for donations of seeds and bulbs for the Garden.

He writes that he left most of his x*Cooperanthes* behind in Calcutta, and that he is beginning with further cross-breeding experiments. The temperature at Lucknow goes down to 40° F. in the winter, and frequently registers 116° F. in the summer. The soil is almost pure sand, very alkaline, and water is plentiful.

It is hoped that as many members as possible will write to Mr. Percy-Lancaster Nat'l Botanical Garden, Lucknow, India, to offer any available seeds and bulbs. He will then give instructions on how to send them.—*Hamilton P. Traub.*

Amaryllis ambigua Sweet, an example of the Long-trumpet Division of Cultivated *Amaryllis* (D-2). Photo by L. S. Hannibal.
Plate 3

2. SPECIOLOGY

[EVOLUTION, DESCRIPTION, CLASSIFICATION AND PHYLOGENY]

DIVISIONS OF CULTIVATED AMARYLLIS

HAMILTON P. TRAUB *

[NOTE BY AMARYLLIS COMMITTEE CHAIRMAN.—"In submitting his revision of the Divisions of Cultivated Amaryllis to the Amaryllis Committee for consideration, Dr. Hamilton P. Traub has offered the benefits of many years of experience, his deep knowledge, and extensive research into the subject. All members of the Amaryllis Committee were asked to offer comments and suggestions. Those of Mr. Thomas R. Manley were very valuable. Mr. Wyndham Hayward felt that simplicity should be stressed. Valuable recommendations were received from Col. Russell S. Wolfe, and his suggestion that illustrations be included has been accepted. Much to our loss, Major John W. Schaefer, a former member of the Committee, is recently deceased.

"This revision has been adopted to fill the present need for a more simplified classification of Amaryllis flower types. If further changes are desirable and needed, they may be made to equal the necessity. Suggestions and recommendations from those who are interested in future revisions are welcomed."—*Robert G. Thornburgh, Chairman, Amaryllis Committee.*]

Prior to 1933, when the American Amaryllis Society was organized, the flower types of cultivated Amaryllis had not been classified. As a rule, the primary aim of the breeder since the 1870's has been to produce the stiff, formal, open-faced, flattish type of flower, not realizing that there is inherent in the genus *Amaryllis* a very wide range of flower types, including among others, very graceful forms. The first classification adopted by the Society in 1934 has been gradually changed to take care of changing needs, but there is still room for improvement. The classification here presented has been especially revised for inclusion in the writer's complete handbook, "Amaryllis". It is an amplification and simplification of the last official American Amaryllis Society classification (Traub, 1950). The original draft was submitted to the Amaryllis Committee of the Society, and with some changes was approved in its present form subject to future revision if needed.

The subgenera of the small-flowering Division, formerly grouped under the genus *Amaryllis* L., have been restored to the general *Rhodophiala* Presl, and *Phycella* Lindl. (Traub, 1952; 1953) as previously indicated in Chapter 3, and thus the small-flowering division of cultivated forms is no longer included. However, a new division of Miniature or short-statured, relatively large-flowering Amaryllis has been added for the first time.

In order to simplify the classification as much as possible, the nine divisions of cultivated Amaryllis have been arranged in numerical order with brief statements about the distinguishing characters of each. This presentation will follow after a few brief explanatory remarks. In this

*This revision was prepared especially for inclusion in the complete popular book, "Amaryllis", by Hamilton P. Traub, which, according to present plans will be published during 1955.

Amaryllis gh. **belladonnaeoides** cl. 'Garfield Triumph', an example of Division of cultivated **Amaryllis.** (Reproduced from Herbertia 1936, plate on page 107).
Plate 4

form it can be readily understood by amateurs. It may be used as the basis or blue print for Amaryllis breeders, and as the foundation for exhibition schedules.

It should be noted that further subdivisions may be made within each of the nine groups, but for the present such subgroups have been introduced only to a very limited extent for Divisions 4 and 5.

The flower color variations are so large in Amaryllis that it is impractical to use these as the basis for larger subdivisions as has been done in the case of *Narcissus* L., where color variations are very limited. At the recent local Amaryllis shows in New Orleans and Mobile, no less than 18 color classes have been recognized for hybrid Amaryllis, and color classes are bound to increase with further breeding work. Thus it is necessary to base the primary classification of hybrid Amaryllis on flowering habit and flower structure, and then apply to each of the divisions or subdivisions the color variations that are actually met with locally in making up exhibition schedules.

The nine Divisions of cultivated Amaryllis are briefly considered in the present article.

DESCRIPTION OF DIVISIONS

DIVISION 1. Cultivated Wild Amaryllis (D-1)

All cultivated wild *Amaryllis* L., species, including subdivisions such as sub-species, varieties, forms, and so on, are included. The 45 recognized wild *Amaryllis* L., species have been described in the text by Traub & Moldenke (1949). These should be scrutinized for possible additions to the list of species already in cultivation.

DIVISION 2. Long-trumpet Amaryllis Hybrids (D-2)

Distinguishing characters: the pedicels are relatively long, and the flowers are distinctly drooping. The tepaltube is very long, 4 1/5 to 5½ inches long, and the whole flower is very long and trumpet-shaped similar to the Easter Lily, *Lilium longiflorum*, showing the influence of *Amaryllis immaculata*, *A. tucumana*, *A. viridiflora* and *A. elegans*.

Illustration: Plate 3, *Amaryllis ambigua* (reproduced from Herbertia 1943, page 152, fig. 106).

DIVISION 3. Belladonna Type Amaryllis Hybrids (D-3)

Distinguishing characters: the pedicels are relatively long, and the flowers are usually distinctly drooping. The tepaltube (below 4 inches in length) is much shorter than in Division 2, and the flowers are much shorter, and variously shaped, showing the influence of species with the informal flower structure such as *Amaryllis belladonna* L., *A. vittata*, and so on.

Illustration: Plate 4, *Amaryllis* gh. *belladonnaeoides* cl. 'Garfield Triumph' (reproduced from Herbertia 1936, plate on page 107).

Upper, Reginae Type Hybrid Amaryllis (Division 4)—*(Amaryllis* gh. *reginaeoides):* left, Hermon Brown un-named white (D-4a), markedly imbricated, photo by W. M. James; right, van Tubergen un-named picotee (D-4b), less imbricated, photo by van Tubergen, reproduced from 1947 Herbertia, page 152, fig. 183.

Lower, Leopoldii Type Hybrid Amaryllis (Division 5)—*(Amaryllis* gh. *leopoldiaeoides):* left, cl. 'Doris Lillian', a Ludwig clone (D-5a), markedly imbricated, photo by Armyn Spies; right, an un-named E. McCulloch clone, (D-5b), less imbricated, photo by Mrs. Edith B. Strout. Plate 5

DIVISION 4. Reginae Type Amaryllis Hybrids (D-4)

Distinguishing characters: the pedicels are relatively shorter than in Divisions 2 and 3, and the flowers are slightly drooping, horizontal, or slightly upright. The tepaltube is very short (below 2 inches long) and

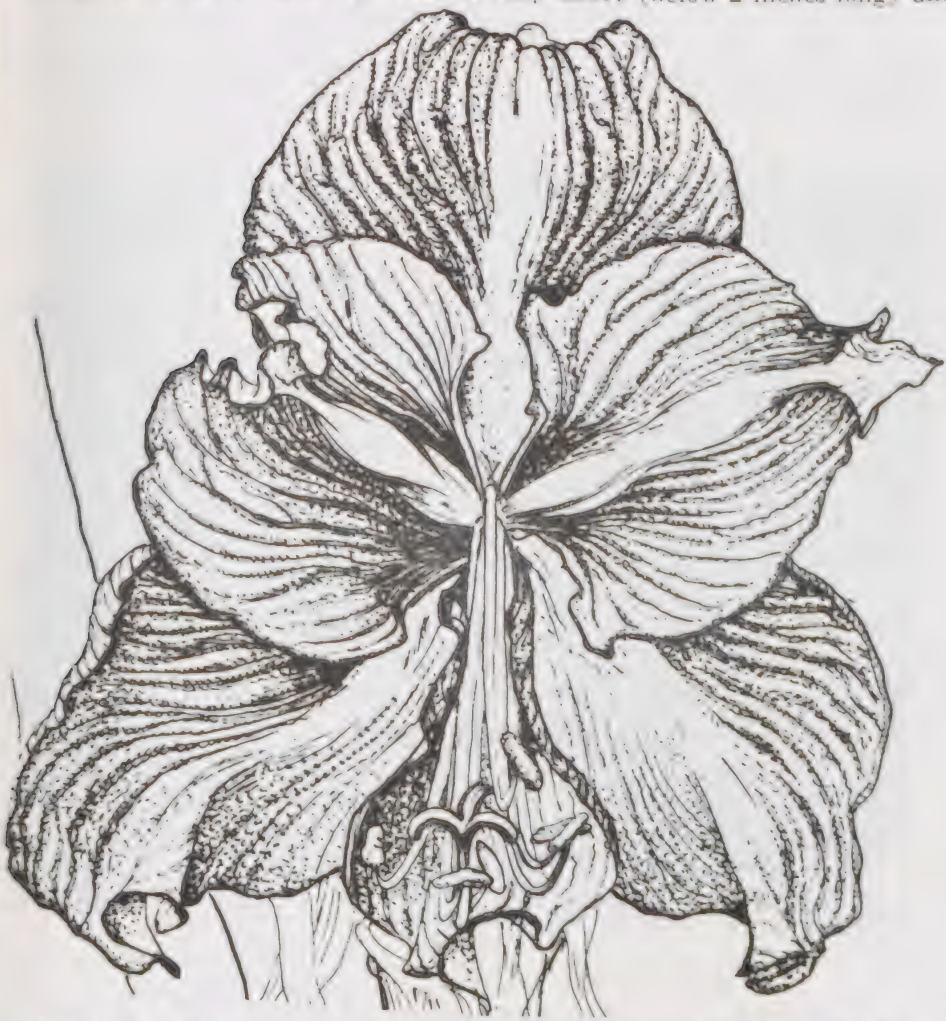

Fig. 1. Orchid-flowering Type Hybrid Amaryllis (Division 6)—(*Amaryllis* gh. *orchidaeflora*): cl. 'Cannae Butterfly', an E. McCulloch seedling raised by Mrs. Polly Anderson; reproduced from drawing by Kenneth Anderson.

the flowers are moderately open-faced, showing the influence of *Amaryllis reginae*, *A. striata*, *A. correiensis*, and so on. The length of the flower when viewed sideways measures above 4 inches.

Two sub-divisions are recognized at present:

D-4a. Markedly imbricated type: the flowers are markedly imbricated. The segs are overlapping for about ¾ or more of their lengths, and the tips are rounded, rarely somewhat pointed. Illustration: Plate 5, upper left, seg tips rounded (reproduced from Herbertia 1948, page 74, fig. 197).

D-4b. Less imbricated types: The flowers are less imbricated. The segs are overlapping for less than ¾ of their lengths, and the tips are somewhat rounded or pointed. Illustration: Plate 5, upper right, segs pointed and reflexed (Reproduced from Herbertia 1947, page 152, fig. 183.)

Fig. 2. Left, *Amaryllis reginae* var. *alberti*, the Double variety native to Cuba. Right, Double Hybrid Amaryllis (Division 7)—(*Amaryllis* gh. *multaetepala*) cl. 'Helen Hull', a McCann clone. Photos by Wyndham Hayward.

DIVISION 5. Leopoldii Type Amaryllis Hybrids (D-5)

Distinguishing characters: similar to Division 4, except that the flowers are wider open, often appearing flattish, and are held horizontally as a rule, showing the influence of *Amaryllis leopoldii* and *A. pardina*. The length of the flower when viewed sideways must be below 4 inches.

Two subdivisions are recognized at present:

D-5. Markedly imbricated type. The flowers are markedly imbricated. The segs are overlapping for almost their entire lengths, and the

tips are rounded. Illustration: Plate 5, lower left.

D-5b. Less imbricated type. Similar to D-5a, except that segs are slightly less imbricated, and the tips are rounded or slightly pointed. Illustration: Plate 5 lower right.

DIVISION 6. Orchid-flowering Amaryllis Hybrids (D-6)

Distinguishing characters: the segs are not arranged according to the usual *Amaryllis* L. flower pattern but are variously shaped, twisted or extremely reflexed, showing the influence of *Amaryllis cybister*, *A. maracasa*, and so on.

Fig. 3. Miniature Type Hybrid Amaryllis (Division 8)—*Amaryllis* x *henryae*, the Henry Miniature hybrid Amaryllis. Photo by Mrs. Mary G. Henry.

Illustration: Fig. 1, *Amaryllis* gh. *orchidaeflora* cl. 'Cannae Butterfly' (Reproduced from Plant Life Vol. 10. 1954). The reader should realize that this Division may contain variously shaped flower types, ranging from the extreme type (not yet produced in hybrids) as shown in *Amaryllis cybister*, in which the flowers are quite irregular as in *Sprekelia formosissima*, to the form in the only named hybrid in this Division at present, 'Cannae Butterfly' (Fig. 1), in which only the tips

of the segs are twisted. Hybridizers have neglected the possibilities offered in this Division, and it is hoped that before long they will fill in this gap.

DIVISION 7. Double Hybrid Amaryllis (D-7)

Distinguishing characters: This division includes all semi-double and fully double forms of hybrid origin under culture. Illustration: Fig. 2, right (reproduced from Herbertia Edition, Plant Life 1950, page 106, fig. 21.) Fig. 2, left, *Amaryllis reginae* var. *albertii* represents one of the parents of the McCann Double Hybrids; the other parents were Mead Strain hybrids.

DIVISION 8. Miniature Type Hybrid Amaryllis (D-8)

Distinguishing characters: distinctly dwarf-statured forms, including various flower types, showing the influence of *Amaryllis espiritensis*, *A. reticulata*, and other dwarf species. Although the flowers are somewhat smaller than those of the taller-statured types such as the Reginae and Leopoldii hybrids, they are still of good size and harmonize with the smaller peduncle diameter and height.

Illustration: since this division may contain various flower types, one illustration is not sufficient. At present only one of these types can be cited—*Amaryllis* x *henryae* (see Fig. 3). When other Miniature types are produced by breeders, it will be in order to cite additional illustrations.

DIVISION 9. Unclassified Hybrid Amaryllis (D-9)

Distinguishing characters: all hybrids that cannot be placed in any of the foregoing divisions, D-2 to D-8, inclusive.

It is suggested that for convenience and economy, the classification letter-number combinations, D-1, D-2, D-3, and so on, in parentheses, be placed after named hybrid Amaryllis clones when it is desired to indicate their classification.

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PERSONAL EVALUATION OF HYBRID AMARYLLIS CLONES, 1953

ROBERT GRANT THORNBURGH, *California*

For the past several years Mr. Thomas Manley's reports on his hybrid amaryllis trials have been followed with keen appreciative interest. They were so appealing that it was of interest to do the same for ones own pleasure. Though it is easy to express a preference, to analyze virtues or defects becomes difficult since one so often overlooks the questionable defects. It is not unlike an attempt to select which of Beethoven's 3rd, 5th, 7th or 9th symphonies he prefers over the rest. Yet it is not without reward to reflect upon the absolute nobility of the first movement of the Eroica, the brilliant C minor, the rhythm of the 7th or the stupendous 9th. It may be soaring a bit to mention so much perfection in music to those with ears when the problem at hand has to do with the gladdening of the eyes. It serves its purpose when one considers that the pastime of sorting flowers is a pleasant one and again a matter of individual preference.

It is to be hoped that the reader will not gain the feeling that this rating is intended as a dictum. On the contrary, it would be strange indeed if personal preferences did not differ.

Most of the named clones were from Holland and do that industrious people great credit. Very few named clones grown in large quantities can be found in the U. S. A., outside of Florida. It is not a little disquieting to think upon the fact that so many of those in this country who have contributed so much to hybridizing of amaryllis and amaryllids are venerable or else one by one are retiring from the production of worth while flowering bulbs. Of those who have devoted many years to improvement of these flowers, Mr. Hermon Brown has been and still is one of the most assiduous. Mr. W. E. Rice for many years had several acres in hybrid amaryllis. These he attempted to improve by new pollen and special crosses. Mr. Cecil Houdyshel, Mr. Frank Leach and Mr. Orpet have spent many years in growing and improving the amaryllids especially *Brunsvigia*. Although Mr. Fred Howard's immense plantings of excellent hybrid amaryllis still remain at the Howard & Smith's Nursery, there seems to be no one left there who matches his former enthusiasm for bettering the quality of hybrid amaryllis. It is the personal opinion of the writer that at the present time the best hybrid amaryllis grown in this country may be found at the Howard & Smith nursery where they still have fifteen acres planted. There seems to be no other to the best of my knowledge who produces hybrid amaryllis in large quantities that are above the level of the Meade strain in quality. It is to be hoped that the latter will be replaced by better and more worth while strains. The Meade strain has not proven more vigorous in the State of California than other strains. If it were not for the Dutch, then, good hybrid amaryllis in the U. S. A. would be rare indeed.

WHITE

'Casper Ludwig' (Ludwig), Grade B. Very pretty! Two blooms from one scape. Quite symmetrical. Pure white face with faint green in throat and only a fleck of pink on the posterior. The bulb was very small but had been pot bound for two years.

'Ludwig's Dazzler' (Ludwig), Grade AA. This again was the best of the whites I had. The center had no green, only a creamy yellow. Round, symmetrical, short tube, and very strong. Good substance to petals.

'White Giant' (Ludwig), Grade AA. Two scapes each with four flowers. Not so giant this time but very white with a soft green only at the base of each petal. Crenated margins noted this year not present last year.

'Marie Goretti' (Ludwig), Grade AA. This one is different from the last two—it is less formal but utterly graceful. Three scapes scattered over the year.

'Nivalis' (Ludwig), Grade A. Most worth while. See Fig. 4. AM-AAS, 1952.

BICOLORS

'Rose Queen' (van Meeuwen), Grade AA. Vermilion with white center. Blooms abundantly. Color is apt to fade more readily but this one will make your eyes pop.

'Fidelity' (Ludwig), Grade AA. This one is so delicate in appearance and so unusual that it was graded higher. The flowers were all small as hybrid amaryllis are ordinarily seen but there were eight at one time, the color reminded one of pink apple blossoms. The outer portions of petals were a soft pink blending to a white in the centers or throats of each one. Stamens were white to accentuate the effect. Glowing with life!

'Fantasy' (Ludwig), Grade B minus. This one did not appeal to me as much as the others. It was white with rose at tips of petals following back into throat in an undefined stripe. It is one that could insinuate itself into your appreciation since it is beautiful.

'Morning Star' (Ludwig), Grade A. This one is a whopper. If they all came as large as this one there would be no room for the rest. The star is formed by a well defined white stripe from throat to tip of each petal. This one falls in the salmon colored group and is veined enough to bring on a somewhat darker appearance. Very short tube, petals quite wide yet not the "pansy" shape since it is not round. The margins tend to be wavy. It is astonishing that such a large flower can have sufficient substance to keep its shape so well.

'van Tubergen pink', Grade A. Again the white stripes on each petal to form a star with the rest of the flower a Geranium Lake. Most attractive. The van Tubergen firm believes that their amaryllis are all worthy of names but do not attempt to produce clones. Those I have seen bear out their feeling about their product.

'Pink with White Center' (Howard & Smiths), Grade A plus. Geranium Lake (20/1) on borders in a veined net-work. Upper two anterior petals show symmetrical veining of deeper shade, the remaining petals are white. Throat white with soft green at throat. This was included because so many visitors have pointed it out as the one they liked the best. It was selected while in bloom at the nursery and has been used for breeding with very gratifying results.

ROSE

'Doris Lillian' (Ludwigs), Grade AA. This was the best of the rose colors. Very clear. This year it was Turkey red (771/3) and Cherry (722/3) on the Royal Horticultural Society's Colour Chart. At times this is so deep in color as to leave the rose color group and become a carmine-red. As it ages it takes on a bluish appearance sometimes.

'Moreno' (Warmenhoven), Grade A. Two scapes of four blooms each. All very flat faced, large and graceful. A porcelain Rose (RHS 620).

'Margaret Truman' (Ludwig), Grade AA. This is much like 'Pink Perfection' to the best of my recollection. One scape of three blooms, six and a half inches across. Petals individually wide. A clear uniform color of Carmine Rose (621 RHS).

'Pink Perfection' (Ludwig), Grade AA. Year after year this blooms regularly with strong blossoms and several scapes. Not only that but it is a good multiplier. It offsets readily and will bloom from small bulbs if there is a good root system. It was found to be quite hardy out of doors here in California. From all aspects it should really be this bulb that has proved the most satisfactory.

'American Fashion' (Ludwig), Grade B. This had a most attractive pink color with veining. Due to weather conditions it opened like a spring crocus. Since the color is good, it is to be hoped that it will do better the next season.

'Rossini' (Ludwig), Grade B plus. Two scapes of three blooms each. Seven inches across the face, each petal 3 inches wide. Faint green in the throat not noticeable except on close inspection but present on base posteriorly to a more noticeable extent. Tubular. Carmine Rose (621 RHS). Comparison of the flower color with color on printed paper of a color chart is seldom accurate. It was felt in this case that the color of this one was somewhat more vivid than the preceding but difficult to describe. The color did not seem to be a duplication of the others.

'Roselinde' (Ludwig), Grade A. Spinel Pink (0625/1 RHS) with a center of white and green. This one will undo your prejudice against green since here it is not an adulterant but actually enhances the pink color. It comes out quite bravely and effectively in the center and is not harsh. It is as soft as the pink is soft. One could hardly ask for more delicacy.

SALMON

'Pinkster Flower' (Ludwig), Grade B. Shrimp Red (616), greenish-white stripe on each petal extending about one-half the length of the

petal. Tends to a light picotee at the edges. Very wide, flat face, each petal is 3½ inches across. Seven to eight inches across face. This one greatly resembles Warmenhoven's 'Sweet Seventeen'.

'Salmon Joy' (Ludwig), Grade A. The bloom is so large, exuberant and bright that it can hardly fail to please anyone with an eye to bright colors. The small yellowish lines in the throat do not add to its attractiveness but are not noticeable to one who isn't looking for blemishes. It often seems ridiculous to be so critical of such a gorgeous production of nature.

Fig. 4. Miss Jassamine Thornburgh, and Dutch Hybrid Amaryllis. From left to right, 'Queen Superiora', 'Nivalis', 'Faust' (top), 'Moreno' and 'Superba'. Reproduced from a kodachrome by Dr. Robert G. Thornburgh.

REDS

'Queen Superiora' (van Meeuwen), Grade AA. (See Fig. 4, and Plate 7.) This variety made the top of my list for all amaryllis bloomed in 1953. It is capricious in the way it blooms and may not always come

out well. Last year a difference in the weather spoiled it. This year every one of this variety performed beyond expectations for any hybrid amaryllis. The buds were a self Garnet Brown (00918/1) but open up to a Blood Red (820/2 to 820 RHS). Others varied from Vermilion (18) to Scarlet (19) to Orient Red (819) and even deeper in color. One was a Dutch Vermilion (717). All were very clear selfs with no adulterants of any kind. Some were veined. The blooms characteristically pointed or angled upwards as contrasted to the drooping varieties. The petals had wavy margins and there were crinkled ears in the throats. Most of them showed two scapes of four blooms each. This is not always a dependable bloomer especially if too hot on the day of opening. The variations in shade do not necessarily prove that these are not clones. One finds that the same bulb will produce variation in shades from year to year. The humidity and temperature may have something to do with this.

'Superba' (van Meeuwen), Grade AA. (See Fig. 4.) Blood Red (820) to Current Red (821) on the posterior. Crinkled ears in the throat. A very dark red self much resembling 'Queen Superiora' except that it is much darker than the latter. Four blooms to each scape. Very wide petals with flat open face.

'Faust' (van Meeuwn), Grade B plus. (See Fig. 4.) Scarlet (18 RHS). Two scapes of four blooms each. Throat and posterior show green lines near the base of petals. Stamens green for an inch at base. Seven and a half inches across face. Petals 3 inches wide. No ears in throat. Face slightly up.

'Wyndham Hayward' (Ludwig), Grade B plus. Signal Red (719 RHS). One scape of four blooms. A good regular form. The color is uniform and clear without green anteriorly or posteriorly. Six inches across. Petals three inches wide. Fine veining.

'Maryon' (Ludwig), Grade B plus. Dutch Vermilion (717/2 RHS). Small self red without green on any portion. Flowers point up a bit. Petals three inches wide and face six inches across. Two scapes of three blooms each. Small ears at base of each petal.

'Lucifer' (Warmenhoven), Grade B plus. Mandarin Red (17 RHS). Some green streaks. Petals recurve.

'Julia' (van Meeuwen), Grade A. Dutch Vermilion (717). A uniform self bright color with green only at base of petals posteriorly. They scintillate like gold dust in the sunlight. Petals are wavy on the edges. Face is 5½ inches across. Though small this one was extraordinarily beautiful. There were crinkled petaloid ears deep in the throat that were curled or twisted both forward and backwards. Blooms angle up.

'Invincible' (Ludwig), Grade B plus. Poppy Red (16 RHS). Two scapes of four blooms each. Petals medium width. A clear self with no green or yellow anterior though a slight amount of green along keel posteriorly.

'Imperator' (van Meeuwen), Grade B. Signal Red (719/3). One 18 inch scape with three blooms 6½ inches across face. Crinkled ears

Dutch Hybrid Amaryllis (D-5) flowered by Dr. Robert G. Thornburgh—left, 'Bordeaux', and right, 'Queen Superiora'. Reproduced from kodachromes by Dr. Robert G. Thornburgh.
Plate 7

in throat with short stubby yellow band ¼ inch by 1 inch at base of each petal. Blooms angle up.

'American Express' (Ludwig), Grade A plus. This one has always been the best of my reds in the past and is a consistent good bloomer. Very gratifying to those who enjoy the bright reds. Signal red (719 RHS). Scratchy lines in the throat at times that are not noted except upon very close inspection. Blooms droop slightly but not consistently. Four blooms to each scape. Very flat and silky. Shines in the sun light. Almost unbelievably bright red. Looks very much alive.

'Halley' (Ludwig), Grade A. Very wide petals with geometric symmetry. Fire Red (15 RHS). Clear self nearly uniform in color except for deepening of color in throat. Slight tendency for formation of ears. Very fine network of veins. One scape of four blooms. The appearance of blooms seemed slightly different than the previous year but again this may have been due to difference in humidity or temperature.

'Franklin D. Roosevelt' (Ludwig), Grade A. One of the deepest reds you will find. A clear self deep dark Orient Red (819 RHS). Throat tends to be Currant Red (821/2). Two scapes of four blooms each. Excellent flat symmetrical flower.

'Love Fire' (Ludwig), Grade B. This one opened poorly probably because the greenhouse became overheated. Undoubtedly it will do better under other circumstances. Signal Red (719 RHS). Center of throat slightly blood red (820/2) but with a very faint yellow almost invisible near the base of petals.

'General MacArthur' (Ludwig), Grade B plus. A good red.

'Ardor' (Ludwig), Grade B minus. Orient Red (817). This one didn't open very well and at the time the temperature was far lower than it should have been for good blooming. It was, however, definitely a self red with no green.

Van Tubergen Scarlets. Three bulbs showed blooms of Vermilion (18 RHS). Average was two scapes per bulb with four blooms each. These were all of such extreme brillance and were clear selfs without any show of green or yellow that each was worthy of being a named clone.

INTERMEDIATE-STATURED AMARYLLIS HYBRIDS

Graceful Strain (van Meeuwen), Grade AA. Scarlet (19 RHS). Very small and delicate. Perhaps such surpassing quality would merit the term exquisite. A most extreme self with no green anterior or posteriorly on one bulbs bloom but with some green at base of petals on another bulbs blooms. Very fine veining on petals. Blooms profusely. These are consistently intermediate and quite lovely. Since so many years were expended in producing this strain of selfs, they should be grown more widely. This is worth more rapturous description than I'm capable of giving.

Gracilis Strain (Ludwig), Grade A plus. Capsicum Red (715/1 RHS). A self scarlet with no green whatsoever. Faint yellow lines in mid line and at base of petals about ¾ inch long almost invisible. Two scapes of four blooms each. Petals delicately veined. Not quite as

small as the Graceful Strain of van Meeuwen but graceful indeed.

'Mignon' (Warmenhoven), Grade C minus. One long scape of four medium sized blooms. They were not miniature but almost the size of regular hybrid amaryllis so that they merely looked a bit undersized rather than a dwarf variety. Dull pale red border with white center and green throat.

After reading the foregoing material one may be impressed with the large number of double A ratings. Since Californians are said to use only extravagant terms in describing anything, it becomes difficult not to award the clone 'Queen Superiora' a triple A. It is suggested that with so many beautiful hybrid amaryllis that it is not easy to maintain a deliberate and scientific outlook on the matter. Therefore these ratings are hardly comparable to the scholarly compilation of exact information to be found in Mr. Thomas Manley's ratings.

At this point it may not be too inappropriate to add a word of encouragement to those who are growing and improving such magnificent hybrid amaryllis for our benefits. The commercially difficult feat of producing large numbers of clones by cuttage has proved impractical in California and elsewhere to all of those who have attempted it. Though accomplished in this country successfully, it has not been profitable. It requires the patience and careful attention that most growers are unwilling to give. Those of you who are too ready to pronounce the named varieties as non-clones should reconsider. Observe the same bulbs blooms over several seasons and note the variations.

Crinum gouwsii Traub, **sp. nov.**

Hamilton P. Traub

In 1949, Dr. J. B. Gouws, of the University of Pretoria, published chromosome data on the first reported polyploid *Crinum* species, $2n = 72$ (Plant Life 5: 68-72, Plate 5, fig. 5. 1949). In March, 1950, Dr. Gouws kindly sent seeds of this species to the writer. These germinated and flowers were produced at 1531 Rodeo Road, Arcadia, Calif., in early August, 1953 (see Plate 8). It was at once apparent that this species was quite distinct from *Crinum bulbispermum* (Brum.) M-R & Schw., to which Dr. Gouws had tentatively referred it. In connection with the preparation of the text of the writer's "Amaryllidaceae" for the printer, it was necessary to recognize the species as new, and it has appropriately been named, *Crinum gouwsii*, in honor of Dr. J. B. Gouws who was the very first to record natural polyploidy in the genus *Crinum*. The writer had induced polyploidy in *Crinum asiaticum* by means of colchicine treatment, but this tetroploid has not as yet been described in print.

Crinum gouwsii is a highly decorative species which is easily grown from seeds, and brought into flower in about three years. It is the first polyploid *Crinum* described and should be of value in breeding experiments. Dealers should include it in their collections so that it may become generally available.

Crinum gouwsii Traub, sp. nov.
Plate 8 (Photo by Frederic Traub)

Crinum gouwsii Traub, **sp. nov. (Amaryllidaceae)**

Foliis fere "Lavender Green, RHS-000761" coloris usque ad 45 cm. longis curvatis, in linea centrali canaliculatis, marginibus albidis, ad apice usque ad mediam undulatis, prominentias irregulares minutes gerentibus; pedunculo usque ad 24.5 cm. alto subcomplanato, marginibus rotundatis; valvis spathae 2 liberis lanceolatis usque ad 7 cm. longis; umbella triflora; pedicellis 0.5—1.6 cm. longis; ovario 1 cm. longo, 1.4 cm. lato; floribus bilateraliter symmetricis fragrantibus; tubo tepalorum deorsum curvato 10.5 cm. longo subviridi-rubello, segmentis ad apicem valde recurvatis 8—8.2 cm. longis, 2.5—3.2 cm. latis; staminibus stylisque declinato-adscendentibus e perigonio paullo exsertis.

DESCRIPTION.—Chromosomes: 2n = 72 (Gouws, in Plant Life 5: 68-72, Plate 5, fig. 5. 1949).

Rootstock a tunicated *bulb*, the swollen part globose, up to 12 cm. long, 8.8 cm. in diam., neck 8 cm. long, 3.8 cm. in diam. *Leaves* several, near Lavender Green (000761—RHS), less frost hardy than in *Crinum bulbispermum*, up to 45 cm. long, 4.6 cm. near the base, abruptly enlarging to 5.6 cm. and then gradually narrowing to a pointed apex, the apical portion withering back to 0.6 cm. width in mature leaves, arcuate, with the two sides turned upward, both sides undulating, the margins coriaceous and provided with minute whitish irregular projections. *Peduncle* light green, 24.5 cm. tall, somewhat compressed, with rounded edges, 8.5 x 15 mm. wide at the base, 8.5 x 14 mm. near the apex, enlarging at the apex. *Spathe-valves* 2, free, lanceolate, acute, margins infolded, one 7 cm. long, 2.5 cm. wide at the base, the other slightly smaller; bracteoles very narrow. *Umbel* 3-flowered; flowers bilaterally symmetrical, delightfully sweet-scented. *Pedicels* light green, variable in length, 0.5—1.6 cm. long. *Ovary* 3-locular, light green, 1.4 cm. long, 1 cm. in diameter, slightly 3-sided, edges rounded, ovules many in each locule. *Tepaltube* curved downward, 10.5 cm. long, greenish, very slightly tinged reddish in the upper ¼, 3-sided, edges rounded, 5.8 mm. in diam. at the base, widening very gradually to near the base, and then abruptly to 8 mm. in diam. at the apex. *Tepalsegs* 6, decidedly recurved in the upper region, some apexes touching the back, each tepalseg pure white, with a reddish cusp at the apex, and banded reddish on the back, the color barely showing through on the inside. *Setepalsegs* (setsegs) 3, lanceolate, acute (when straightened out), all 8.2 cm. long, 2.5 cm. wide. *Petepalsegs* (petsegs) 3, the uppermost broadly-oblanceolate, 8 cm. long, 3.6 cm. wide; the lower two, oblanceolate, 8.2 cm. long, 3.2 cm. wide. *Stamens* 6, and *style* declinate-ascending, both slightly exserted from the perigone, the style more so than the stamens. *Filaments* attached at the mouth of the tepaltube, white, pollen light yellowish which appears grayish due to the black pollen-sacs beneath. *Style* white below, reddish in upper 1/3, stigma capitate, obscurely trifid. *Pollen grains* round, of two sizes, similar to the condition in chimaeras, but in this case the two sizes are apparently not due to such a condition because the plants were produced from seeds.

RANGE.—Duiwelskloof, Northern Transvaal. Holotype: Traub 522 (TRA). Additional specimens: Gouws 130, 133, 134, 135 and 147 (PRU). Type illustration: Plate 8.

NOTES.—According to Gouws (1949), this polyploid species "occupies the areas with the most favorable conditions for growth (high pre-

cipitation and temperature) while the diploids occur over wide and less favorable areas" (specimens as cited by Baker, Flora Cap. 6: 203. 1894). At Arcadia, Calif., *Crinum gouwsii* has proved to be less frost hardy than *Crinum bulbispermum* grown in the same row next to it.

—*Hamilton P. Traub*

COLLECTING **ZEPHYRANTHES** IN MEXICO

Lt. Thad M. Howard, *Georgia*

During a hurried pleasure trip through Mexico in early July of 1953, it was my good fortune to collect four distinct species of *Zephyranthes* blooming in their native habitat in Central Mexico, following recent rains. Such luck was wholly unexpected and would be difficult to duplicate again. I was accompanied by a former college classmate of mine, David L. Jordan, who had just come back from Korea. At that time, he was just finishing his tour of duty in the Army and planning to return to College, while I had just finished College and was about to enter the Army. We both had a small amount of overlapping time on our hands, so we decided upon a short vacation into Mexico. The trip from San Antonio, Texas, to Mexico City and back, took only five days, but in this short span of time we were able to collect these small amaryllids as well as visit many interesting sites.

All of Northern Mexico was suffering from the same drought that was searing Texas and the South-west. As we passed through sun-scorched Orange groves south of Monterrey, I could not help but wonder what kinds of new *Zephyranthes* might possibly be buried in the dry soil, anxiously awaiting thirst-quenching rains to catapult them into bloom from their long period of dormancy. Unfortunately the dry conditions in the state of Nuevo Leon prevented us from finding out if any Rain Lilies were present. However, as we drove further into the interior of Mexico, into the state of Tamaulipas, the landscape changed into greener, more productive country, but still we saw no amaryllids.

It was not until we approached cooler, higher altitude of the mountainous regions that we encountered our first *Zephyranthes*. We had just passed through the little tourist resort town of Ciudad Valles in the state of San Luis Potosi when I spotted a colony of yellow *Zephyranthes* growing in a roadside ditch along the highway. Immediately recognizing it as a species new to me, I stopped the car to investigate.

They were light yellow in color, as large, if not larger than *Z. citrina*, but quite distinct from this or any other yellow species that I had seen. They were growing in heavy black soil in full sun and in the part shade of scattered trees. Many of them were standing in water which had collected from recent rains. The long linear foliage was not unlike that of *Z. citrina*.

I asked David to take some colored pictures of the plants and their surroundings so that we could better record the event. We had no tools to dig with, but luckily the soil was soft and mucky, so that it was not

difficult to slip the bulbs out of the earth. As I dug and David clicked his camera, some Mexican workers and some children drew near to see what the "Americanos" were up to. One of them, a friendly young man, volunteered that other Rain Lilies were to be found a bit further south, near Tamazunchale, and that these included white and pink colors.

There were also white *Zephyranthes* (of the subgenus *Cooperia*) scattered among the yellow Rain Lilies, which very strongly resembled *Zephyranthes brazosensis* (syn.-*Cooperia drummondii* Herb.),but I resisted the temptation of collecting them after I inspected them carefully as they did not greatly differ in any appreciable respect from *Zephyranthes brazosensis*. Except for their geographical range, I could not find anything about these white Rain Lilies that differed from the ones that grew around San Antonio. Nevertheless I shall always regret that I did not collect them for scientific reasons even though they offered little in the way of horticultural interest.

The Mexican man assured me that the white Rain Lilies near Tamazunchale were not the same as these. We thanked the man for the information and drove off, anxiously anticipating the finding of other species. We saw no more of the yellow *Zephyranthes* after leaving the original colony although we looked for them. This may explain why Mrs. Morris Clint and others have never located any yellow *Zephyranthes* in this region in their collecting trips in Mexico. Possibly this species may have a limited range, with this single colony being the only one to be found along this highway. As with all *Zephyranthes*, one must be at the right place at the right time after a rain to find them in bloom. It is easy to see how a colony such as this could be overlooked by the plant collector.

We did not have to wait very long that morning before I spotted another *Zephyranthes*, a pink one, blooming alongside the road. We found our second species in the lower mountainous regions about midway between Tamazunchale and Valles. It was a small rosy-pink flower with a lighter colored throat, rather like *Zephyranthes clintiae*. It grew beside the road in the grass in a heavy clay soil. Digging them was difficult as I had only a stick to gouge them out of the soil, and also because the soil was so heavy and gritty. We saw these scattered along the highway for several miles, but nowhere were they abundant.

We ate lunch in the little town of Tamazunchale in the south-eastern tip of the state of San Luis Potosi, before driving any further. Tamazunchale, popularly nick-named "Thomas and Charley" by tourists, is a favorite rest stop for travelers enroute to Mexico City, since about six hours of a steady mountain driving along the serpentine road lies ahead of the traveler after leaving this little village.

Later, in mid-afternoon of the same day, after we had entered the state of Hidalgo, somewhere in the mountains between Chapulhuacan and Jacala, we unexpectedly found our third *Zephyranthes*. By this time I had given up hope of finding any more *Zephyranthes* since we were too high in the mountains, or so I thought. How we discovered this species is an interesting story.

While winding our way around these mountains at an elevation of several thousand feet, we rounded a curve and passed three women and

a girl walking by the side of the road. The young girl waved at us as we passed and I noticed that she was holding a bunch of flowers in her hand. The flowers were of several kinds, but the thing that caught my eye was a large pink *Zephyranthes* in the center of the bunch. Instantly I began to wonder if these had come from a garden or if they had perhaps been picked in the wild. I discounted the second assumption and concluded that they were from a garden. My curiosity was aroused so I stopped the car and backed the car to where the women were standing. I asked the girl where she got the *Zephyranthes* and if she had any for sale. She shook her head and pointed up the road saying that they came from near her house near the top of the mountain. I assumed that perhaps she meant her own garden. Since they were still a good long way from the house she spoke of, and since the flower was apparently *Zephyranthes grandiflora*, and more important, since we were in a hurry to reach Mexico City before dark, we decided to drive on. Anyway, it was obvious that my friend was beginning to weary of Rain Lilies and the fuss that was made over each new variety encountered. It was no secret that neither botany or horticulture aroused any more than casual interest for him. I sighed and again drove up the mountain. However I again began to think about the flower that I had just seen. True, it did resemble *Z. grandiflora*, but there was something about it that was different. Curiosity again got the best of me, and again I backed down the mountain, this time determined to get bulbs of this species at all costs. Again I stopped the car alongside the women, and I told the girl that I should like to obtain some bulbs from her. David groaned agonizingly. Again luck was with us, for the girl pointed across the road and directed my sights to a spot where a bright pink large-flowered *Zephyranthes* was blooming on the side of the mountain along the highway. She dug this one with a sickle that she carried. We then found others growing nearby and dug these, she with the point of her sickle and I with my hands. The soil was moist, gritty and loose.

We did not have any Mexican money at the time to give to these women, but we did have some papayas in the trunk of the car. We offered these to the women and they were accepted gratefully. It was obvious that we had made a good deal, and that both parties were mutually happy. David was happy that the whole transaction required no more time than it did. I was relieved too that we found them so easily without having to do any mountain climbing. We saw more of these *Zephyranthes* blooming on the mountain sides along the road for the next few miles, and we stopped and dug a few more, but since the day was lengthening into afternoon we had to hurry on if we were to reach Mexico City before dark. I never would have guessed that *Zephyranthes* would grow natively at such high altitudes in the mountains. True, our first two species were growing several hundred feet above the level of the sea, but here was a species growing some five thousand or more feet above sea level, on the sides of mountains.

Good fortune never deserted us, for in visiting the famous Ancient pyramids at San Juan Teotihuacan near Mexico City, I spotted another new species from our automobile at Tepexpan, not many miles from the

site of these ancient structures. Again I stopped the car to examine and collect. Fortunately, this time I had a knife to dig with, as the soil was very dry and hard. Surprisingly, this species was very variable in color. Here were some white ones, there grew some pink ones, and again mixed in with these would be white ones with rosy suffusions on the back-side of each segment of the corolla. The majority of these were of the latter description. Aside from the fact that some flowers were pure white while others were rose-pink, they were exactly alike. The stems were only a few inches in height, but would probably have been longer if there had been more rainfall. The dry earth in which they were blooming indicated that the precipitation that had lulled them into bloom had been scanty. These bulbs grew in open grassy fields in what were once shallow salt lakes during the Aztec civilization, but these lakes had since been drained and placed in cultivation. Very little farming was done however, as crops did not thrive on these salt flats. The flowers were chalice-shaped or crocus-like in form, but since these were collected in the afternoon, this may be of no significance, as many *Zephyranthes* assume this shape after first opening widely in the morning.

The large mountain species was of special interest to me because of its resemblance to *Zephyranthes grandiflora*. There has been a good bit of mystery surrounding the original native habitat of *Z. grandiflora*, and the fact that it rarely, if ever, sets seed. The high percentage of freak flowers (abnormal number of petals, anthers, abnormal shapes, etc.), the apparent sterility of the flower coupled with its capacity for vegetative increase, and the scanty information surrounding its original native habitat has often caused some botanists to wonder whether it is a valid species, a hybrid, or a mutation from the wild state. It has always been the wish of botanists that some one would again collect this species as it originally grew in its native habitat. Whether or not the large pink species that Mr. Jordan and I found in the mountains in the state of Hidalgo is *Z. grandiflora* in its original form, or a distinct nearly-related species remains to be determined. It is not exactly identical with *Z. grandiflora*, but the resemblances in size, color, and to some extent in the form, are suggestive of some relationship. It will be interesting to see how these different species adapt themselves to cultivation, and it is strongly hoped that they will succeed, as they are all of real merit as garden material. The large pink mountain species should be especially valuable in hybridizing. Efforts will be made to propagate these various species so that eventually they might be shared with others. In the mean time, it is hoped that other enthusiasts who should happen to visit Mexico will keep an eye cocked for these little amaryllids, for there may still be many as yet undescribed and unknown to botanists, or perhaps described and introduced, only to be lost to cultivation.

1953 REPORT ON THE TRAUB-USDA DAYLILIES

STANLEY E. SAXTON, *New York*

Continuing our 1950-1952 evaluation report given in Herbertia 1953 (Page 67), additional growth, up to Dec. 25, 1953, has brought the total number of fans to the following figures. Allowance has been made for a few divisions sent out.

Name	*Original Planting.*	*1952*	*1953*
1. 'Clarinda'	4	22	40
2. 'Emily Dickinson'	5	20	30
3. 'Gita'	2	5	6
4. 'Golden Triangle'	2	4	5
5. 'Iowa'	2	7	10
6. 'Krishna'	1	8	15
7. 'Lemon Tulip'	2	4	9
8. 'Mary Henry'	3	13	26
9. 'Mitra'	3	8	14
10. 'Papagaio'	1	4	4
11. 'Purity'	3	12	21
12. 'Reinbeck'	2	10	11
13. 'Saffron Queen'	2	6	15
14. 'Stephen Foster'	2	2	3
15. 'Susanna'	1	3	4

Contributing Conditions: Most of these plants are still in the original clumps. In some cases [as in 'Reinbeck' and 'Krishna'] the clumps are crowded, and it is probable that more increase would have been realized if the clumps had been divided in the spring of 1953.

Summary: In general the increase compares favorably with that normally experienced under our conditions.

'Krishna' still shows the greatest percentage of increase, followed in order by: 'Clarinda'; 'Mary Henry'; 'Saffron Queen'; 'Purity'; 'Emily Dickinson'; 'Reinbeck' and 'Iowa'. We consider the remainder too slow in increase to be good commercial types under our conditions.

It is interesting to note however that 'Lemon Tulip' made better growth during the last year, as did 'Saffron Queen'. Perhaps 'Lemon Tulip' takes longer to establish. 'Stephen Foster', 'Papagaio' and 'Susanna' performed poorly; the last two particularly, in view of their previous growth.

As regards the flowers our favorite is still Mary Henry. 'Saffron Queen' impressed us with its medium tall colorful clump of wide petaled golden flowers. Planted in front of the taller, lighter colored flowers of 'Emily Dickinson' the combination was most pleasing. 'Clarinda' made an excellent showing. 'Golden Triangle' flowered fairly well but did not impress us as favorably as the others mentioned.

AMARYLLID NOTES

HAMILTON P. TRAUB, *California*

Percy-Lancaster Hybrids. The hybrids made by Percy-Lancaster within the genus *Zephyranthes*, and between *Zephyranthes* and *Habranthus*, have never been properly named. In connection with the preparation of the text of the manuscript of the *Amaryllidaceae* it has been

Fig. 5. The Green Orchid-flowering Amaryllis—*Amaryllis viridorchida*. Photo by Frederic Traub.

necessary to propose the following names for these hybrids:

Zephyranthes x *lancateri* Traub, *hybr. nov.* (*Zephyranthes brazosensis* Traub x *Z. grandiflora* Lindl.); syn.- x*Cooperanthes rosea* Percy-Lancaster, in Jour. Roy. Hort. Soc. 38: 531. 1912-1913.

Zephyranthes x *blanda* (Percy-Lancaster) Traub, *comb. nov.*

(*Zephyranthes brazosensis* Traub x *Z. treatiae* S. Wats.); syn.- x*Cooperanthes blanda* Percy-Lancaster, in Jour. Roy. Hort. Soc. 38: 531. 1912-1913.

Zephyranthes x *percyi* Traub, *hybr. nov.* (*Zephyranthes citrina* Baker x *Zephyranthes brazosensis* Traub); syn.- x*Cooperanthes* 'Percy', Percy-Lancaster, in Jour. Roy. Hort. Soc. 38: 532. 1912-1913 (type); x*Cooperanthes* 'Sydney', l. c. (reverse cross).

xSYDNEYA Traub, *hybr. gen.* nov. Traub (*Amaryllidaceae*), *Zephyranthes* Herb. x *Habranthus* Herb., syn.- x*Cooperanthes* Percy-Lancaster, in Jour. Roy. Hort. Soc. 38: 531-532. 1912-1913, in part. x*Sydneya lancasterae* Traub, *comb. nov.* (type), syn.- x*Cooperanthes lancastrae* Percy-Lancaster, in Jour. Roy. Hort. Soc. 38: 531. 1912-1913 [*Zephyranthes brazosensis* Traub x *Habranthus tubispathus* (L'Herit.) Traub]; x*Cooperanthes* 'Alipore Beauty' Percy-Lancaster, l. c. p. 532; x*Cooperanthes bella* Percy-Lancaster, l. c. p. 531; x*Cooperanthes* 'Mary', Percy-Lancaster, l. c. p. 532.

x*Sydneya india* Traub, *nom. nov.* (syn.- x*Cooperanthes* 'Sunset', Percy-Lancaster, l. c. p. 531 (*Zephyranthes brazosensis* Traub X *Habranthus andersonii* Herb. x. Lindl.).

Amaryllis viridorchida. This species was described in Plant Life 7: 31—33, fig. 3. 1951. The only photograph of this species available at that time was not up to the high standard required for an adequate illustration. To make good this deficiency, an excellent portrait of the species made by Frederic Traub in the fall of 1953 is reproduced in Figure 5.

All attempts to set seeds on *Amaryllis viridorchida* by self-pollination have failed so far. Thus it has not been possible to obtain increase for distribution. Attempts will be made to obtain seeds by sibling pollination.

Crinum species with reddish leaves. Mr. & Mrs. Corbet have brought back a most interesting *Crinum* species from Hawaii where it is reported to be common in cultivation. This is a tall growing species with leaves that are deeply tinged reddish over the green background, especially in leaves of large blooming-size plants. This species cannot be confused with *Crinum erythrophyllum* Herb., which is a dwarf and prostrate plant, native to Burma. An attempt will be made to identify the tall reddish-leaved species for the next Herbertia; at any rate, a picture of the plant will be included in the next issue.

REGISTRATION OF NEW AMARYLLID CLONES

Registrars: Dr. J. B. S. Norton and Prof. W. R. Ballard

This information is published to avoid duplication of names, and to provide a space for recording brief descriptions of new Amaryllid clones. Names should be as short as possible—one word is sufficient. It is suggested that in no case should more than two words be used. *The descriptions must be prepared in the form as shown in the entries below, and must be typewritten and doubled-spaced.* The descriptive terms used should be in harmony with those given in the "Descriptive Catalog of Hemerocallis Clones, 1893-1948" by Norton, Sauntz and Ballard.

There is close liaison between the AMERICAN PLANT LIFE SOCIETY and the HEMEROCALLIS SOCIETY regarding the registration of new *xHemerocallis* clones. By cooperative arrangement with the HEMEROCALLIS SOCIETY, beginning with the 1951 HERBERTIA edition, descriptions of only such *xHemerocallis* clones for which the registration fee has been paid to Registrar, Mr. Harry I. Tuggle, P. O. Box 1108, Martinsville, Va., will be registered, and numbered (example: 3322-R). The number "3322" indicating the number of the clone and the "R," the information that it is registered. The registration fee is required *only* in the case of *xHemerocallis* clones, and *not* for other amaryllids which are registered free of charge by the AMERICAN PLANT LIFE SOCIETY. It should be noted that in a free country such as ours, registration is *entirely voluntary*, and does not replace the right of anyone to publish names with descriptions in recognized publication media elsewhere and thus obtain priority under the generally recognized INTERNATIONAL CODE OF BOTANICAL NOMENCLATURE and the INTERNATIONAL CODE OF NOMENCLATURE FOR CULTIVATED PLANTS (1953) which cover all plant names.

Correspondence regarding new amaryllid clones, including *Hemerocallis*, to appear in HERBERTIA should be addressed to Prof. J. B. S. Norton, 4922 40th Place, Hyattsville, Maryland, *enclosing self-addressed, stamped envelope, if reply is expected.*

For obvious reasons, there is a limit to the number of descriptions included from any one member in any one issue. Not more than five brief descriptions of clones under each generic heading will be published from any one member in any one issue of HERBERTIA. Descriptions of clones in excess of five brief descriptions, up to a total of 25, will be entered if the space required for each is limited to one line. In this case use should be made of the standard abbreviations already mentioned.

THE AMERICAN PLANT LIFE SOCIETY numbers the clones known to be published, including those registered and not registered, in various publication media. It is thus an easy matter to report the approximate number of named clones as of any date. Such a report will be made as of July 1 in each year. On July 1, 1953, a total of 4458 hybrid *Hemerocallis* clones had been named.

xCRINODONNA CLONE

xCrinodonna corsii clone 'Lon Delkin', Traub, **cl. nov.**

This hybrid of unknown origin is similar to x*Crinodonna corsii* clone 'Fred Howard' (syn.-*Amacrinum howardii*), but the pedicels are a little longer, and the flowers are a little smaller and of a more perfect form, the umbel is up to 9-flowered. This hybrid is closest to x*Crinodonna corsii* clone 'Dorothy Hannibal' (see Plant Life 8: 85-86. 1952) which is however 18-flowered. Thus this hybrid is most likely a cross between *Crinum moorei* and *Brunsvigia rosea* var. *minor*.

x*Crinodonna corsii* clone LON DELKIN was obtained by Mr. Alonzo C. Delkin, of Arcadia, Calif., from Mr. Tom Shimoda, of Monrovia, Calif., in 1943, who had collected it in a field in the City of Los Angeles many years ago before the population had expanded to its present proportions. The species has been appropriately named for Mr. Delkin who is an outstanding amateur horticulturist and amaryllidiarian. One of his specialties is Crinum species, hybrid Crinums and xCrinodonnas.

HYBRID HEMEROCALLIS CLONES

Introduced by Stanley E. Saxton, Saratoga Springs, New York:

'Aloha'. Cool pastel pink bitone. Ivory petals flushed light pink. Cream toned sepals shaded a lighter pink. Large gracefully recurved flower on 50″ stems. Midseason. [4419-R]

'Big Time'. Exceptionally large bright orange-scarlet blend. The petals are golden yellow flushed scarlet which is deeper toward the petal edges. The sepals are more uniformly light scarlet. All segments are recurved. Stems about 40″. Flowering late midseason. [4420-R]

'Bishop'. Large very deep maroon purple flower. The sepals are a lighter shade giving the effect of a bitone. Tall, showy and very brilliant in effect. 55″. Midseason. [4421-R]

'Corduroy'. Medium size flower in shades of mahogany and tan. There is a delicate gold hairline edge around all segments as well as gold midribs. The sepals recurve while the broad petals flare and twist at the ends. 38″. Midseason. (No. 2710-R)

'Soft Light'. Large compact ruffled flower of mimosa yellow having a light flush of gold near the throat. Tends to throw double and semi-double flowers when established. 48″ stems. Late midseason. [4422-R]

AMARYLLID GENERA AND SPECIES

HAROLD N. MOLDENKE

[In this department the descriptions of amaryllid genera and species, particularly recent ones, translated from foreign languages, will be published from time to time so that these will be available to the readers.]

Sternbergia caucasica Willd., in Ges. Nat. Freunde, Berlin Mag. 2: 27. 1808. Leaves linear-lanceolate, rather erect; segments of the corolla ovate. A perennial growing in the Caucasus Mountains.

Hymenocallis eulae Shinners, in Field & Lab. 19: 103. 1951. Related to *H. liriosma*, but blooming after the withering of the leaves, and the tube of the perianth longer, 8—12 cm. long.

Paramongaia weberbaueri Velarde, in Lilloa: 491-492. 1949. Leaves 6—8, borne in a distichous fashion, glaucous, up to 77 cm. long and 5 cm. wide; scape up to 55 cm. long, 1-flowered or very rarely 2-flowered; flowers short-pedunculate, large, very beautiful, lemon-colored very sweetly fragrant; tube of the perigonium about 10 cm. long, the tepals plainly in two ranks, those of the outer whorl being elliptic-lanceolate and to 9 cm. long and 3.7 cm. wide, those of the inner whorl being ovate-cuneate, obtuse at the apex, and up to 8.5 cm. long and 4.7 cm. wide; the staminal corona showy, about 8.5 cm. long, 2 cm. wide at the base and 7.5 cm. wide at the mouth; free portions of the filaments about 11 mm. long, arising from a spot between 1 and 2 cm. below the mouth of the staminal corona; ovary 3-angled and 3-celled, 1.8—3 cm. long, 1—1.3 cm. in diameter; style about 19 cm. long and 2 mm. in diameter, ending in a peltate and 3-lobed stigma; capsule 3.7 cm. long and 2.8 cm. in diameter; seeds applanate, winged, 12 mm. long and 9 mm. wide; embryo terete, about 5 mm. long and 1 mm. in diameter. Found on the slopes called Lomas on the upper Paramonga (Pacar, Lupin) and Huarmey.

Paramongaia Velarde, in Lilloa: 489. 1949. Tube of the perigonium elongate, curved, narrowed toward the base, gradually widened to the apex, but with the sides of the same thickness throughout; tepals of almost the same length [=subequal—HNM], conspicuously 2-ranked, mucronate, those of the inner whorl sometimes obtuse at the apex and at other times with a form like that of the ones in the outer whorl; staminal corona large, almost the same length as the tepals, funnel-form, its mouth 6-lobed, the lobes short but broad, truncate and dentate or sometimes also 2-lobed, on the inside with 6 green longitudinal lines for about 2/3 of its length from the base to the mouth and indicating the part of the filaments adnate to the corona; the free portion of the filaments arising at the apex of the green coronal lines, about 1/5 as long as they are, and sharply bent from their base toward the inside of the staminal corona; anthers dorsifixed, introrse, yellow; ovary 3-celled, the ovules very numerous in each cell, flat, inserted perpendicularly to the placenta in two series; style filiform, completely free for its entire length, without any blade-like expansions, almost cylindric; stigma peltate and 3-lobed; capsule more or less isodiametric or somewhat elliptic, plainly 3-angled; seeds numerous, almost as many as the ovules, flattened, winged, more or less reniform, pale-brown, the wing either oblong like the body of the seed or sometimes broader; scape variable in length, compressed, elliptic in cross-section, 1- (or rarely 2-) flowered at its apex; peduncle very short; bracts oblong-triangular, membranous, marcescent at the time of anthesis; leaves linear-carinate; bulb tunicate, more or less globose, producing buds in the axils of the outer coats.

Hieronymiella Pax, in Bot. Jahrb. 11: 327. 1890. Perigonium funnel-form, its tube cylindric, very long, the lobes recurved-spreading, much shorter than the tube; stamens attached to the throat, shorter than the perigonium; filaments subequal, elongate, winged to the apex, the

wings protracted at their apex into teeth that are about the same length as the anthers; anthers linear-oblong, dorsifixed near the base; ovary 3-celled; style filiform, shorter than the perigonium; stigma trifid, the lobes recurved; ovules very numerous in each cell, in 2 series; flowers many, borne in pseudo-umbellate inflorescences, erect, short-pedicellate, almost subsessile; outer involucral bracts 2, lanceolate, quickly marcescent.

Hieronymiella clidanthoides Pax, in Bot. Jahrb. 11: 327. 1890. Leaves narrowly linear, glaucescent, 3 mm. wide; scape lofty, 3 mm. in diameter, 12—20 cm. tall; involucral bracts long-acuminate, pale, 7—8 cm. long, almost 1 cm. wide at the base; inflorescence 4- or 5-flowered; pedicels 5—10 mm. long; perigonium yellow, its tube not ampliate, about 10 cm. long and 3 mm. in diameter, its lobes oblong-lanceolate, acuminate, 4 cm. long and 6—8 mm. wide; filaments winged, 15 mm. long, the teeth triangular, acuminate; anthers 6—8 mm. long, the teeth 6—7 mm. long; style 12 cm. long, surpassing the stamens; ovary 1.5—2 cm. long. Argentina: on the plateau of Nascimientos, prov. Catamarca, collected by Lorentz in January, 1872.

Eustephia argentina Pax, in Bot. Jahrb. 11: 328. 1890. Leaves linear, obtuse, 20—30 cm. long, 5—6 mm. wide, apparently subglaucescent; scape lofty, to 20 cm. tall; bracts 2, rose-colored, lanceolate, 6—8 cm. long, the inner ones membranous, pale, setaceous, and much smaller; inflorescence many-flowered, in pseudo-umbels, the flowers 12 or more, longly and unequally pedicellate, nodding, subsecund; pedicels very unequal, 3—12 cm. long; perigonium scarlet, its tube very short, to 3 cm. long and 1.5 cm. in diameter, its segments oblong-obovate, to 6 mm. wide, the 3 outer ones acute, the 3 inner ones very obtuse, shallowly emarginate, apiculate; stamens slightly surpassing the perigonium, the filaments attached to the segments of the perigonium, only slightly connate to each other at their very base, dilated up to two-thirds their length, one-dentate on both sides above the middle, the tooth obtuse; anthers versatile; ovary triangular; style filiform, scarcely 3 cm. long, subequaling the stamens; stigma 3-lobed; capsule 3-angled; immature seeds with a black testa, shiny. Argentina: very frequent in higher localities, Cuesta de la Negrilla and Cuesta del Durazno, prov. Catamarca, collected by Schickendantz in November and December, 1873.

Eustephia marginata Pax, in Bot. Jahrb. 11: 328. 1890. Bulb brown, ovoid, 4 cm. in diameter, elongated into a neck; leaves narrowly linear, coriaceous, narrowly white-margined, glaucous, to 30 cm. or more long, scarcely 5 mm. wide, scabrous along the margin; scape lofty, almost 12 cm. tall; involucral bracts all quickly marcescent, pale, the outer ones 8 cm. long, longer than the pedicels; inflorescence many-flowered, in pseudo-umbels, the flowers about 12, unequally pedicellate, nodding, produced at the same time as the leaves, funnel-form; pedicels 3—6 cm. long; perigonium 3.5 cm. long, 1.5 cm. in diameter, rose-colored, its tube very short, its outer segments oblong-obovate, 6 mm. wide, and mucronulate, its inner segments narrower and very obtuse; stamens slightly surpassing the perigonium; filaments attached to the segments of the perigonium, scarcely connate to each other at their very base, dilated to two-

thirds their length, one-dentate on both sides above the middle, the tooth acute; anthers versatile; ovary triangular; style filiform, 4 cm. long, exserted, surpassing the stamens; stigma capitate, small. Argentina: Sierra Famatina, La Incrucijada (Encruicijada), at 2500 to 3000 meters altitude, collected by G. Hieronymus and G. Niederlein on January 21 and February 2, 1879.

Crocopsis Pax, in Bot. Jahrb. 11: 324. 1890. Perigonium funnelform, straight, its tube very long, ampliate into a throat above, its lobes subequal, erect-patent above; stamens attached in the throat, equal, included, erect; filaments dilated toward the base, connate to each other; anthers linear, dorsifixed; ovary 3-celled; style filiform, straight; stigma capitate; ovules numerous in each cell, in two series; bulb tunicate, elongated into a neck; leaves linear; scape produced underground; flower solitary, sessile in a tubular spathaceous bract that is bifid at its apex.

Crocopsis fulgens Pax, in Bot. Jahrb. 11: 324. 1890. Entire plant dwarf, with the habit of a *Crocus* or *Colchicum;* bulb brown, 2—3 cm. in diameter; scape hidden in the neck of the bulb; leaves (not completely developed) 3—4 cm. long, 2 mm. wide, subglaucous, narrowly linear, recurved, shorter than the flowers; spathe subequaling the tube of the perigonium, which is slender, 4—4.5 cm. long, scarcely 2 mm. wide at the base but almost 4 cm. wide at the throat, its lobes obovate, almost 2 cm. long, 5—6 mm. wide, fire-red, narrowed toward the base, the outer ones apiculate, the inner ones obtuse; stamens slightly shorter than the perigonium; filaments 4.5 cm. long, 2—3 mm. wide at the base; style equaling the filaments; ovary oblong, triangular. Peru: between Tacore and Tomarape, at 4200 meters altitude, collected by Stuebel in October, 1876.

Zephyranthes hieronymii Pax, in Bot. Jahrb. 11: 324. 1890. In the affinity of *Z. candida* (Lindl.) Herb.; lofty; bulb protracted conspicuously into a neck; leaves synanthous, narrowly linear, almost equaling the scape; spathe split laterally almost to the base, not bifid; flower erect, very short-pedicellate; perigonium white, somewhat pinkish outside, small, its tube very short, the segments narrowly oblong, subobtuse; alternate filaments shorter; style equaling the filaments; stigma capitate, 3-lobed; capsule medium-sized; bulb brown, 1—1.5 cm. in diameter, the neck 6—9 cm. long; leaves 12—16 cm. long, 1 mm. wide; scape slender, 10—15 cm. tall; spathe 1.5—2.5 cm. long, membranous, somewhat pinkish outside; flower subsessile or very shortly pedicellate; pedicel 1—2 mm. long; segments of the perigonium 5—10 mm. long, the tube short; filaments included, the longer ones about equaling the middle of the perigonium; style equaling the longer filaments, slender; stigma thick; capsule 3-lobed, 3-sulcate, 5—7.5 mm. in diameter. Collected in meadows, Concepcion del Uruguay (Dr. Lorentz 878) and in wet meadows in Uruguay, June, 1874 (Arechavaleta 2584).

3. GENETICS AND BREEDING

THE McCULLOCH HYBRID AMARYLLIS STRAIN

EDITH B. STROUT, *California*

Some time back, I read a report in Herbertia by G. K. Cowlishaw of New South Wales, Australia concerning the culture of Amaryllis in Australia. He stated that the "strains of Messrs. P. V. McCulloch of Warrawee and E. McCulloch of Mosman in New South Wales are the

Fig. 6. Seedling McCulloch Hybrid Amaryllis (D-5b); 8-inch bloom, white keel and background, striped crimson, copiously dotted with crimson. Photo by Mrs. Edith B. Strout.

best in the world. These strains are more or less intermingled, though the latter possesses the greater range of color, and are the result of many years of careful cross breeding and selection. The commencement of the strain was from plants of the once famous Bradley collection, in its day

as outstanding as are those of the McCullochs today. Bradley was a very keen hybridist specializing in Amaryllidaceae, and he raised some very beautiful flowers. In the Amaryllis he aimed at large regular flowers with equal perianth segments, clear colors and well reflexed petals.

"On Bradley's death Mr. P. V. McCulloch took up the work from where he left off, and gradually by patient work and always following the ideals laid down by Mr. Bradley, achieved the wonderful strain he possesses today. His nephew, Mr. E. McCulloch, who always took a keen interest in these plants, and the work of his uncle, during the past ten years or so, has made a good collection of plants, all seedlings of either P. V. McCulloch's raising or his own.

"The flowers of these strains are in the main of a deep self crimson for it was this color for which both Bradley and McCulloch bred, most of these possess a dark red eye and do not show one particle of green."

This was fuel to the fire of my enthusiasm in my search for a deep red self, so I started inquiries, writing direct to Mr. E. McCulloch in Mosman, Australia. The result of this was some very interesting correspondence from which I learned a great deal and this information I'd like to pass on to other fanciers.

Mr. McCulloch seemed surprised that anyone in America should have heard of him and said that Mr. Cowlishaw had exaggerated. "I would be very much surprised if both Holford and de Rothschild in England hadn't better stuff and we have never raised a bloom 14 inches across unless perhaps if it was pressed out, the largest of our flowers measured 11½ inches and it is a very shapely flower. I have some of what I call pastel shades and pinks which I think are quite new and very fine good form and wide bottom petal, and the flowers are a good eight to ten inches in diameter.

"Our (stock) is built up from bulbs obtained from Holland and England and from the late H. H. B. Bradley about thirty years ago and we have simply crossed the flowers we fancied working on the theory that form followed the mother flower and using the lower or lip petal of the male flower."

In his letters, Mr. McCulloch mentioned many times several points regarding hybridization. He believed in these most emphatically, though his views on using pollen from the stamen above the lower petal * is in disagreement with the generally accepted genetic principles. Since he did all his hybridizing by applying these two points, and had such fine success by using them, others may be interested in hearing his opinions:—

"There are two points I wish to emphasize as regards hybridizing, two fundamentals which I have proved most conclusively over a period

*McCulloch's claim is erroneous because the pollen grains have all arisen from the same parental tissue. Thus, barring mutations, the pollen from all six stamens is the same. We know that mutations occur in Amaryllis only very rarely, and if mutations should occur the chances of this happening in any of the six stamens would be equal. Mrs. Strout writes that one of her correspondents has informed her that McCulloch's "hypothesis" was published in the Journal of the Royal Horticultural Society some years back. It has apparently been ignored.—**Editor**

of 30 years. In hybridizing, the *form* will follow the mother flower and the best results are got by using the pollen from the lower or lip petal. I could not believe that using the pollen from the weakest petal could be right until I proved it again and again. I am sure our best results came about by our concentrating on this. My informant in the first place was the late H. H. B. Bradley who did so much here in the early days of the development of amaryllis.

Fig. 7. Seedling McCulloch Hybrid Amaryllis—chartreuse green segs, white keels and cardinal stripes on both sides of keel. Photo by Mrs. Edith B. Strout.

"If you consider it, this in no way interferes with the Mendel theory. It still works out at 50%, 25% and 25% only the results of the improvement are far greater. . . . If you will broadcast my information through your Journal I am sure some of your growers would derive benefit from my experience unless, of course, my information is stale news.

". . . Mr. P. V. McCulloch and I have about five thousand bulbs between us and have no room to grow any more and because the bulbs have been growing in the same soil all these years, they are not doing what they should, therefore we would be very glad to have some of our stock grown in your country. . . . If you care to try the experiment I am only too glad to help you out."

"In a letter of November 30th, 1944, Mr. McCulloch said "the hybridizations I have made for you are coming along well and I think I will have a fair variety of seeds for you though as you requested self reds will predominate. . . . I would suggest if we send you too many seed to grow yourself you might have some friends who would grow the surplus."

Fig. 8. Bulb from originator, McCulloch Hybrid Amaryllis (D-5b)—flowers with segs recurved. Photo by Mrs. Edith B. Strout.

In May of 1945 I received ten large amaryllis bulbs and 19 packets of seed. As I could not use all of the seed, I planted about 100 and sent a similar amount to Mr. Hermon Brown, distributing the balance to members of the Amaryllis Round Robins.

In a later letter Mr. McCulloch stated "you will be sorry to learn that as far as Amaryllis are concerned I am finished. My bulbs developed a virus and in spite of all I could do, hormones, change of soil, etc. I have lost the lot, some 2000 bulbs. The strain is not quite lost as a Dr. Stayner here had started to build up a small collection using my bulbs and pollen; also a few bulbs I took to Kew Gardens, London, in 1935, I hear have done quite well." Naturally, as soon as I received

this news, I sent back seed of the McCulloch bulbs, some selfed, some crossed, some crossed with Holland pollen. Unfortunately Mr. McCulloch did not get the opportunity to see these flower, for in November of 1951 he died of a heart attack.

THE McCULLOCH HYBRIDS

Due to unfavorable conditions here, a change of residence, and just carelessness, I have lost some of the ten original bulbs sent me. The seedlings have grown slowly and few have flowered for me, but I've certainly been pleased with those that have bloomed.

Three of the original bulbs that have bloomed for me have been red selfs. The first one had 2 scapes, with 4 bells each, with flowers 9½

Fig. 9. McCulloch Hybrid Amaryllis: left, clone from originator, 9½ inch bloom, "Cherry striped." Right, seedling "stripe on Mosman pink", 8½ inch bloom, pink with deeper pink or red picotee lines on all edges. Photos by Mrs. Edith B. Strout.

inches across with outer petals 4 inches wide. Scarlet with a definite purple overcast. The texture was quite smooth with just a little of the "seersucker" effect seen so often in large flowers. The second one was also a scarlet, with large petals but these were very recurved so the effect was only like that of a 7-inch flower. Another 8½-inch red self (Vermilion R. H. S. 18) had a very deep iridescent star. All of these were the same color on the outside and the face of the flower.

Some of the original bulbs received from McCulloch, and seedlings are illustrated in Plate 5, lower right, and Figs. 6, 7, 8 and 9.

One of my favorites is what I call "Cherry striped." (See Fig. 9, left). This is a 9½-inch bloom, with keels and throat chartreuse green,

with cherry red (RHS 722) stripes or patches on both sides of keels nearly to the edges, but the edges are white. The red stripes on the lower petals are Geranium Lake (RHS 20/1). This I happen to like very much but McCulloch described it as being too rugged, as it always had been for him.

When I received the bulbs and seed from Mr. McCulloch he said "You should get much better blooms from the seeds than the bulbs when they eventually flower. The bulbs are fairly old stock and the seeds are crosses of the newer ones which have not yet increased in numbers." So it was with great impatience that I waited for them to bloom.

But my seedlings have had too many set backs to do well, though some of the Round Robin members have had theirs bloom. An offset of one was given me which has an 8" blossom, white keels from throat about half the length of the petals, heavily striped with crimson (RHS 22) and overlaid with lots of crimson dots. The outside of petals also heavily dotted. (See Fig. 6).

Another seedling sounds like one that should be thrown out, but I personally found it so unusual and charming I fell in love with it. It had chartreuse green petals (RHS 663/1), white keels, Pea Green (RHS 61/1) throat, Cardinal red (RHS 822/2) stripes both sides of keel on upper three petals, about half way out, then red stripes fade into red dots, sprinkled on petals but stopping before the edges are reached. Each "spur" at tips of petals is also cardinal red, even on the lower petal. Backs of petals are brown-green, heavily speckled with red dots on upper petal. The cardinal stripes appear more rose than they actually are, but the contrast with the chartreuse green and the spot of red at tips of petals makes it a striking blossom. (See Fig. 7).

But my favorite seedling was from a group labeled "Stripe on Mosman Pink" (see Fig. 9, right). This was a 8½-inch bloom with outer petals 4¼ inches wide and the lower petal a full 2 inches, and was what Mr. McCulloch called "the squared jawed type". It was one of his last developments and he expected to get some good results from this type by using it as a male parent. The flower has a white ground, spotted with red dots, light red stripes on both sides of keel on upper three petals, but pink from keel to edges, flushed pink on lower inner petals. There is a red picotee line on edges of all petals, as if the Master Engraver wanted to emphasize the beautiful symmetry of this bloom. This one blossom alone was worth waiting years to see.

THE McCULLOCH AMARYLLIS HYBRIDS

POLLY ANDERSON, *California*

In 1949, the first of the seedlings of the Australian hybridizer, McCulloch, bloomed. These seed were sent through the Amaryllis Robins by Edith Strout, who corresponded with McCulloch.

This first one was a huge very odd giant, with twisted petal tips and strongly ridged petals. The petals began their ruffling from the rigid,

greenish white, thick rib. Background color was white but it was so thickly striped and dotted that the appearance was of a red flower with white ribs. The tips were folded and twisted, the edges curled, giving the flower the general shape of a tall triangle. Stamens and pistil were extra long, white, stippled red, and the stigma was edged in red. The leaves were the widest of any amaryllis I grow and rather short, 2½" by 10" long. Four flowers were in bloom at once. This has been named, 'Cannae Butterfly', by Dr. Traub, and serves as the first illustration (Fig. 1) of the Orchid-flowering Division (D-6) of Hybrid Amaryllis.

The second seedling to bloom was the darkest red I've ever seen and a pure self, even on the reverse side. The rounded sepals were 3½" at their widest point, the petals 2¼, both with pointed tips. There was a white beard or fringe masking the tube, but otherwise no other color in the throat, not even a darker eye zone. The extra long stamens and half-inch longer pistil were the same deep red. The second time this flower bloomed it was even larger with 4" sepals and 3½" petals.

The third seedling was also a pure red, about two shades lighter than the other red, and two sizes smaller, but with the same rounded petal with pointed tips, a 6½-inch flower, sepals 2¾" and petals 1¾". As with all the other McCulloch seedlings the stamens and pistil were the same color as the flower, and exceedingly long. The two reds were a bit smoother flowers than the two with white ground color, but in general all 4 seedlings were what I would call rough, coarse flowers, but nonetheless beautiful.

In 1952 the fourth seedling bloomed, a near white with a hairline of red around the edges of all segments. The top two petals and sepal had wide ribs of white, heavily striped with red on either side, growing lighter as the stripes radiated outward. The lower two sepals were striped above the rib but not below, and the lowest petal was pure white with red edges. As the flower aged the red color seemed to intensify and spread, making the picotee edge much more distinct on the lower segments but blending with the red striping on the upper segments giving the flower the effect of top 2/3rds red and bottom third white with red edges.

WANTED: DAYLILY INHERITANCE DATA

R. W. Ballard, *Maryland*

Daylily breeders no doubt often wish that they had some definite rules which would guarantee the results which they vainly seek. There are certain reasons why such rules can not be laid down. It is, perhaps, sufficient to indicate that most of the modern varieties are the result of many crossings and re-crossings, and their genetic make-up is unknown. Some breeders have attempted by in-breeding to reduce their stock to pure lines. This entails a tremendous amount of work and it is questionable whether the results secured are justified.

On the other hand it would seem that certain broad assumptions might be established by securing accurate records of performance in the ordinary crossing of varieties. Some workers may have already accomplished this end through long experience and close observation. If this be true, the information does not seem to be readily available to all concerned.

It is generally assumed that yellows crossed by yellows will produce yellows and that reds crossed by reds are most likely to produce reds. Have these results been justified by your experience? It is most intriguing to observe the large number of shades of yellow, orange, red and other colors which show up in the daylily. Then when one considers the large number of blends and distinct color patterns, we have a most bewildering palette of colors to deal with. Can any semblance of order come out of this chaotic situation?

Perhaps the assembling of information already in the hands of experienced breeders might throw some light on these problems. In lieu of this, certain definite problems could be subjected to a concerted attack and the results made available to breeders in general.

As a suggestion of the type of questions which might yield valuable data include such things as these; in crossing yellows with reds, will one color dominate the other or is the result more likely to be a blend? What results when an early flowering variety is crossed with a late bloomer? Most of the late bloomers are inclined to have small or medium sized flowers. Can the large flowers of the midseason sorts be combined with the small flowers of the late bloomers and thus build up a group of late summer and early fall varieties with large flowers? How can this best be accomplished?

The writer's work with daylily breeding has so far been largely a hit or miss matter. Varieties which seemed to have desirable qualities have been combined but no accurate check on the results secured has been made. To further complicate matters, often mixed pollen has been used in crosses in order to increase the resulting variations.

One of the main lines of the work has been the development of late blooming sorts with larger flowers and a greater range of colors. Considerable progress has been made in this direction. Some attempt has been made to preserve pollen from the better mid-season bloomers to use on the later blooming sorts. A zinc chloride dessicator has been used for this purpose. Some success has been attained but through faulty technique or otherwise, the pollen has not remained viable as long as could be desired.

To date a fairly satisfactory stock of breeding material has been developed out of which, it is hoped, may come distinct advances in this field. One seedling has established a record of beginning to bloom the last July and continuing to flower until the middle of September.

The past season a substantial number of crosses have been made designed to answer some of the questions herein proposed. It is planned to carry these crosses through to the blooming stage to determine whether the underlying assumptions have been justified.

It would seem to be a worth while project for all breeders of daylilies to aid in the assembling of breeding results to the end that more definite guidance to the best methods for progress towards the development of this adaptable flower may be available.

EARLY BLOOMING NARCISSUS

J. S. Cooley, *Maryland*

With the first warm days of late winter or early spring we eagerly anticipate the first narcissus flowers. The only early narcissus variety our grandparents had was 'Golden Spur' which is very inferior to modern varieties. Also it does not persist well in adverse conditions. The narcissus breeders in the regions having a climate somewhat similar to ours (near Washington, D. C.) would no doubt find it very interesting to try to breed a variety that is early and yet highly resistant to cold. Most of the early varieties have some serious objection, some do not persist well from one season to the next. Others are satisfactory some seasons, but in other years the flowers are injured by the cold.

The most satisfactory early variety for me has been 'February Gold'. It blooms earlier than 'The First' and earlier than 'Obvallaris' and almost as early as the species *N. minor*. It has a rich color and persists well and multiplies well. It is more resistant to cold than any other variety we have tried. Last spring 'February Gold' and 'The First' were growing in a similar exposure. The flowers of 'February Gold' that were open at the time of a cold spell were not killed by the freezing temperature, whereas the flowers or rather the necks of the flowers of 'The First' were killed.

The breeding work that has been done in crossing horticultural varieties with species has yielded splendid results. Further work in this direction would no doubt result in early varieties of merit.

One of the objectives in my breeding work has been a good early blooming variety. Among the early blooming seedlings there is one that for the two years that it has bloomed has been earlier than any other narcissus on our grounds. We are hoping that further tests will indicate that it has merit.

UNEQUALLY YOKED NARCISSUS HYBRIDS

W. R. Ballard, *Maryland*

What an exciting time it is when the new narcissus seedlings begin to bloom! Each recurrent morning is awaited with eager expectation! This gorgeous newcomer will surely be a winner and that beauty is not to be sneezed at. However, with the passing of first impressions, critical inspection starts and then the thrill of achievement begins to fade. What is the trouble?

Analysis of hundreds of seedling blooms reveals that too often the perianth is the offender. Linked with that wonderful white trumpet of

exquisite texture is a thin, irregular perianth with half the size needed to balance the superb tube.

As contrasted with the trumpet or cup, the perianth seems sadly lacking in versatility. Narcissus breeders are generally willing to settle for a symmetrically formed perianth with even color, smooth surface and good proportions. On the other hand, what variety in size, form, color and texture in trumpet and cup can be confidently expected! What a range in size from the small dainty cup to the huge trumpets! In form there is the flat saucer shape, the long straight tube and the wide flaring trumpet. The tube may be smooth or fluted, the margin plain or variously frilled or lacinated. Occasionally most unusual forms unexpectedly appear. Two seedlings in my garden last year showed up with from two to three flat circular disc-like excrescences on the sides of the tubes. Whether this is a permanent manifestation or simply a seasonal disturbance remains to be seen.

Even in color, the cups and trumpets are away out in front. Recent years have shown truly remarkable advancement in the range of color. Perhaps the most notable has been the appearance of the pink shades. However, apricots, buffs and reds are showing up. Whites, creams and all sorts of variations in yellow and orange are available. Some of the daintiest combinations show delicate green tints. Color in the perianth seems to be limited largely to white, yellow and orange, although in some of the newer varieties, apricots and shades of pink and red seem to be spreading out from the cups or trumpets.

In general the cups and trumpets seem to have much greater substance than that found in the perianth. This may be inherent in the nature of the flower. However, some perianths are much better in this respect than others and the use of the better forms in breeding undoubtedly leads to improvements in the substance of the perianth, even though it may never equal that found in the best cups or trumpets.

It has been interesting to note that visitors to my garden go into raptures over some seedling with a large imposing trumpet, even though the perianth may be so poor that the seedling has already been marked for discard. In evaluating new contenders for public favor, it would seem that the breeder of new varieties, must still keep in mind that a good perianth is an essential factor in determining merit.

THE 'ANNE DODSON' DAYLILY

The writer had the good fortune of seeing on May 10 the new 'Anne Dodson' Daylily which was produced by Mr. Quinn Buck, Arcadia, Calif. The flowers are full and a bright rosy-bronzy pastel; fragrant; setsegs 1½″ wide; petsegs 1⅝″ wide; plant robust; foliage somewhat erect, 25″ high; scapes 36″ tall, and bear 12—20 flowers each; season early in Calif. It was named for Mrs. Anne Dodson Buck, the mother of E. Quinn Buck.—*Hamilton P. Traub.*

4. AMARYLLID CULTURE

[REGIONAL ADAPTATION, SOILS, FERTILIZATION, IRRIGATION, USE IN LANDSCAPE, DISEASE AND INSECT CONTROL, ETC.]

PROBLEMS IN EVALUATING AND MERCHANDISING AMARYLLIS

THOMAS R. MANLEY, *Vermont*

The Royal Dutch Amaryllis may have been familiar to a few American amaryllis connoisseurs prior to 1946. To the average grower of amaryllis they were unknown and unobtainable as the necessity of vegetative propagation made their increase slow and expensive. Several Dutch firms were offering seedlings typed according to color, two of these firms were offering named varieties that were vegetatively propagated. It was evident these hybrids were superior to most existing amaryllis available on the world market. Their huge flat florets in a wide range of clean colors were destined to rank among the finest available today.

Valleevue Test Garden under the sponsorship of the Garden Center of Cleveland and Western Reserve University was testing many types of plants. It became evident to Arnold Davis, Garden Center Director and the author that this new amaryllis would make an ideal pot plant for the window gardener and provide the greenhouse gardener choice plants equal to any found in the finest conservatories.

In 1949 we contacted H. De Graaff & Son, Lisse, Holland, to obtain the Van Meeuwen Superiora Strain and Ludwig & Company, Hillegom, Holland, for the Ludwig Strain for comparison strain tests. We were informed by a leading Dutch concern that another excellent strain existed, those produced by W. S. Warmenhoven of Lisse, Holland, whose clones could be obtained through P. J. Komen, Anna Paulowna, Holland.

Ludwig & Company due to the hybridizing genius of C. Ludwig over the past thirty-five years have produced many noteworthy clones. Noted for excellent pure white clones this firm now possesses some of the excellent varieties in a wide range of colors ranging from deep red through salmon to rose and pink. They publish the finest amaryllis catalogue available today with many excellent photographs of their choice named varieties.

W. S. Warmenhoven, Zonnewende, Hillegom, was one of the first firms to propagate the amaryllis vegetatively using the technique developed by Miss Ida Luyten at Wageningen in 1926. Possessing some of the finest seedlings and named varieties in existence they have carefully propagated these varieties for the world market. Warmenhoven varieties range in color from purest white to deepest wine red. All are characterized by huge flat florets of great substance and unique form.

H. De Graaff & Son, Lisse, Holland has an excellent strain of scarlet, red and white amaryllis which they originally sold under color. Their

excellent seedlings, vegetatively propagated, are very large and all are flat in appearance, many measure ten inches or more in diameter. This firm was the first to offer the prepared amaryllis for Christmas forcing on the American market. Specially treated bulbs produce huge red or white flowers for Christmas when potted early in November. They also market an excellent intermediate-statured, smaller-flowered strain, these are hybrids of *Amaryllis striata* (Syn.—*Amaryllis rutila*), have been named the Graceful strain. They produce up to four scapes with four to six florets per scape. Florets are about four inches in diameter, flat in appearance with thin scapes that are in proportion to the smaller florets.

The initial project was to study and evaluate these strains to determine which might be superior. As the clones bloomed it became apparent that another approach to the testing program must be made, that of evaluating named clones rather than strains. Similarity in color and form of clones with different names was apparent. Many were so nearly alike it was impossible to distinguish one clone from another. Duplication in names of clones existed adding to the confusion of marketing this new flower. Finally the proper cultural techniques for the novice grower had to be developed and presented in a brief and practical manner.

It was quite apparent that much competition existed among the producers of these strains of amaryllis. Voluminous correspondence was necessary to explain the objects desired in presenting these new hybrid amaryllis as a choice pot plant before the American public. Name duplications had to be eliminated, clones must be true to name, names must be short and descriptive and the stock must be of the highest quality, capable of producing several scapes of bloom.

Splendid cooperation from the Dutch growers soon eliminated the name duplications and descriptive names are being used rather than names of personalities of little interest to the grower and more often a detriment to the sale of the clone. As an example, one of the finest gladiolus produced in Holland was a failure on the American market because it was named for a political personage unpopular to the American public. Many growers renamed it, grew and exhibited it in that manner but it soon lost favor as cataloguers dropped it when sales were not large enough to merit its propagation. Clones similar in color and form were excluded from further propagation once the best of these was known. Thus we have endeavored to establish a well controlled introductory program among the Dutch amaryllis growers.

In 1950 it was decided that an introductory display must be made to acquaint the public with Dutch amaryllis. Arnold Davis decided that The Garden Center would place a five hundred foot display in the 1950 Cleveland Flower Show. It was necessary to have two hundred, seven inch pots, of amaryllis available for the show. These were supplied by the three Dutch firms whose varieties were on test at Valleevue.

The display was a great success. It highlighted the entire show. People were enthralled with the beauty, size and grandeur of this new flower. The Dutch amaryllis were rapidly made a part of the American

flower lover's repertoire. Representatives of the Dutch firms for whom we were growing amaryllis were present and were impressed with the public appeal of their flowers. Plans were made for increased production and higher standards of quality.

With the public acceptance of the amaryllis as a pot plant for the home other problems arose. One was that of shipping the bulbs to America during the winter in such a manner as to keep them from freezing since they are very susceptible to temperatures below thirty-four degrees fahrenheit. Those packed in sawdust or excelsior and shipped in tight wooden cases, heated during the long shipping period. This resulted in excessive growth of the scape causing it to bend and often produced malformed florets. Open boxes caused the bulbs to chill or freeze in transit.

Many cases of bulbs were chilled without apparent injury to the stock which was sold by the unsuspecting retailer without knowledge that the chilled bulbs would not bloom satisfactorily. Many customers were disappointed.

Several seasons of experimentation, using many kinds of packing materials and containers have resulted in two acceptable methods of packing. Warmenhoven amaryllis are shipped by P. J. Komen Company in heavy wooden crates. These crates are made of half-inch tongue and groove lumber glued at the seams forming a warm tight container which is lined with several heavy layers of felt paper. The bulbs packed in sawdust or wood shavings arrive in good condition. Some sweating was observed on an early shipment in late November partially due to the freshly cured bulbs.

A similar shipment by Ludwig & Company packed in the same type container with a coarse vermiculite as a packing material arrived in excellent condition. The high absorptive power of the vermiculite lessened the danger of sweating due to greater water absorption and better aeration provided by less compaction of the coarse vermiculite. It appears that vermiculite is superior to wood shavings for packing these bulbs for ocean shipment in air tight containers.

Bulb size has presented another problem to the prospective buyer. The initial shipments were made in jumbo sizes 32″/and up in circumference as there were reserve stocks of bulbs three or more years old. These bulbs were of tremendous size and capable of producing three or more scapes in many instances. The initial demand soon exhausted all of these bulbs and facilities in Holland were taxed to produce enough top size 28″/32″ circum. bulbs for sale. Reduction in size materially reduces the output of the bulbs—due to their smaller size they produce fewer scapes with fewer flowers. Top size bulbs usually produce two scapes with four or more florets per scape. At present these represent the largest size available in named clones.

Large bulbs, No. 1, 26″/28″ circum., produce one scape, occasionally two, with four florets per scape. This is the size commonly sold by most American cataloguers. Avoid disappointment and accept no smaller size bulb unless you are an experienced grower and realize the potentialities of the size of the bulb you purchase.

Misrepresentation by some of our large seed businesses has seriously hurt the Dutch amaryllis. A check of our national flower shows reveals that one will find on display plants or cut scapes of Dutch amaryllis in bloom which are supposed to represent the bulbs on sale, yet the bulbs available for sale will be American field grown amaryllis which are not capable of producing scapes or florets comparable with the Dutch amaryllis.

The lack of cultural information in regard to growing amaryllis as a pot plant has retarded sales. Much misinformation is passed to purchasers of amaryllis by incompetent salesmen. Recently at a national flower show I heard ridiculous claims made by a salesman of a large eastern firm. It was evident he knew nothing of their culture. The purchaser of those bulbs was destined to be disappointed due to ignorance on the part of a would be horticulturist. We need a good pamphlet or book on amaryllis culture, prepared by an amaryllis authority. Two books on Amaryllis are now in preparation, one by Dr. Hamilton P. Traub, and the other by Miss Peggy Schulz, and both will be published as soon as possible. Amaryllis culture is rapidly changing as new hybrids demand more precise cultural techniques. Field grown hybrids were rugged small flowered types that could withstand poor soils, lack of water and considerably more cold weather than the complexly bred Dutch and American hybrids which are less tolerant to adverse conditions.

The use of the Amaryllis as a florist flower fits into the rigid forcing schedule of crop rotations of the average commercial greenhouse. For this purpose the amaryllis is ideal requiring bench space only sixty days. Cultural techniques for forcing for particular dates where commercial or exhibition requirements must be met, require not only knowledge of good cultural practices but that of the physiology of each variety grown, its response to heat, humidity and water. These hybrids promise a new flower that can be used as a pot plant and as a cut flower. An ever changing cultural program is under way as research continues revealing the flexibility of the amaryllis.

Few people realize the potential value of the amaryllis as a cut flower. Scapes cut when the buds have fully elongated may be held in the average florist's refrigerated show cases or store rooms for a week without opening. The scapes packed in moist cloth not placed in water will remain fresh and will open when they are placed in a warm seventy degree room. Undeveloped buds will elongate and bloom. Open florets have a great water holding capacity. They will remain fresh out of water for several days making them an ideal flower for funeral sprays and large arrangements. Careful merchandizing, plus high quality bulbs will make the amaryllis one of our most popular flowers.

FORCING AMARYLLIS FOR EXHIBITION PURPOSES

THOMAS R. MANLEY, *Vermont*

The culture developed by the Valleevue Trial Garden staff for forcing amaryllis for exhibition purposes was the result of long years of greenhouse experience in growing exhibition ornamentals by Arnold Davis and the results of experimental research by the author. Once we realized the great flexibility of the amaryllis to environmental conditions we developed a cultural technique which would give us the maximum number of different clones in bloom on a specific date.

Our supply of these clones was always limited thus we relied on our skill to bloom nearly every plant on the date of the show. Our stock never exceeded two hundred fifty plants of show clones, our display required from two hundred to two hundred twenty-five plants.

During the first season we observed that clones responded to growth and could be classified in three categories: *early*, those which produced scapes about two to three weeks ahead of the average blooming time of other varieties, Ludwig's 'Early White' and several other Ludwig clones were in this group as were some of the Van Meeuwen Superiora reds; *midseason*, when the majority of the clones bloomed; and *late*, those which bloomed two to four weeks after the midseason clones, several Ludwig clones were in this group, 'Ludwig's Dazzler'.

For show purposes we endeavored to work with the early and midseason clones which we could control. It was virtually impossible to force the late clones into bloom as they were too slow in producing a scape. To add to the novelty of forcing clones for a certain date was the lack of uniformity within a clone to forcing after they were forced several seasons. It was observed that after two or three seasons of intensive forcing the bulbs were exhausted regardless of the cultural practices used in rejuvenating the stock.

The bulbs were planted early in December in six or seven inch pots depending on the size of the bulbs. The soil mixture used was one part composted cow manure not over one year old, one part coarse bank sand, one part coarsely shredded compost and one part heavy clay loam. The pH of the soil was 6.2. It tested medium in nitrogen, high in phosphorous and potassium. Lime was added to the compost to assure a high calcium level.

Each pot had a layer of crushed crockery in the bottom to assure good drainage. To the soil mixture was added about one tablespoonful of steamed bone meal per pot. The bulbs were planted one to a pot with one-half of the bulb above the soil level. The soil was moistened and the pots placed on a bench where the bottom heat was seventy degrees to hasten rooting. The greenhouse temperature was held at sixty degrees. Frequent check on root development was made. Clones which showed slow or no root development were removed from the pot and soaked in one hundred degree water for one hour. They were then repotted and given a starter solution containing dilute indole—3—butyric acid to hasten root growth. Once the bulbs showed evidence of sufficient root

development water was withheld except to moisten the soil once a week and the house temperature was lowered to fifty degrees.

Bulbs which were held over were repotted in December removing only dry soil which fell away from the roots when they were knocked out of the pots to see if any aphids were feeding on the root system, a frequent occurrence when the pots were plunged in the soil during the summer. When aphids were present they were killed by parathion spray or dust and the infected root area removed. Once repotted the soil was moistened, and the pots were then placed in a cool greenhouse along with the recently acquired bulbs that were rooted.

Sixty days prior to the opening date of the show all pots were placed in a seventy degree house and watered with warm ninety degree water. During the next four weeks observations of the scape development were made, early clones which showed development in advance of the others were moved to a cool house temperature of fifty degrees or if the scape continued to elongate the temperature was dropped to forty degrees to retard its elongation till the other clones had reached that stage of growth.

It was observed that once the scape began to elongate it could be controlled with temperature. However its response to temperature prior to the emergence of the bud from the bulb was a matter of uncertainty. Bulbs of early clones stored at forty degrees for several weeks were slow to respond to growth. Lower temperatures made growth responses less accurate and in some cases the scapes failed to elongate due to the chilling effects of cold storage. Storage temperatures should not go below fifty degrees for best results.

It is quite a task keeping scape development equal on a collection of amaryllis. Each bulb has its own response. Bulbs of the same size and variety will react differently. We forced as many as sixty different varieties at a time and were fortunate enough to have all of them in bloom for the show.

Thirty days before the show, bulbs that have not produced scapes should be placed in a warmer house. We were fortunate in having a small propagating house in which we could raise the temperature to one hundred and ten degrees. Bulbs which were sluggish in beginning to develop scapes were placed in this house at ninety degrees until they began to show rapid growth. Slowly responding bulbs remained in this house until they were in bloom.

Growth on the main crop was kept under control by regulating the temperature which averaged sixty to seventy degrees. Leaf growth was best when the cooler temperature was maintained. Some clones produced abundant leaf growth while others did not until the scape had elongated and the florets open. Those producing leaf growth accompanying scape formation are most desirable.

The scapes should be about eighteen to thirty-six inches long by the end of the seventh week. It is desirable to have a range of heights for greater versatility in arranging the plants in the display. Jumbo bulbs usually produced two scapes for the show, one which we endeavored to have open at the beginning of the show, and the other to open during

the show. Plants which were developed too fast were placed in the cool house while those which developed slowly remained in the warm house.

The final week prior to the show was one of continuous moving of plants from one house to the other depending on the advancement of the plants. Those with open flowers were held at forty degrees; those with separated buds were carried at fifty degrees; while those with scapes slowly elongating were given an extreme forcing treatment. Pots were placed in the propagating house temperature of one hundred degrees. A Binks humidifier provided continuous moisture which was directed toward the walk so that there was no accumulation of water on the plants. During the night five hundred watt flood lights kept the light intensity high. This treatment brought the most sluggish plant into bloom.

The day prior to movement of the plants to the show was one devoted to hardening the plants by placing all those with open florets in a cool forty degree house. Each scape was supported with a green bamboo stake which was securely tied with eight inch twistems. Every open floret had the anthers removed before they had shed any pollen. The partially open bud is the ideal stage for anther removal. Florets that were not pollinated remained fresh several days longer than those that were fertilized. The unsightliness of pollen on the floret was also eliminated by early emasculation.

Each plant was wrapped in wax paper to protect the florets in transit from rubbing and excessive movement. The tendency of the floret, due to its mode of attachment, to snap off is one of the great problems in transporting amaryllis in bloom. A waxed paper covering over the floret and attached to the scape and its supporting stake solved this problem. We lost very few florets in transit by eliminating as much movement as possible.

The entire plant was wrapped in newspapers the thickness depending upon the temperature, thick enough to insure safety from freezing. The pots were packed in a closed truck and transported to the show.

Arnold Davis designed the display and secured a desirable number of suitable accessories to make it unique and of great audience appeal. Forced shrubs and well formed evergreens were used as a background for the displays. Needless to say these displays highlighted the show.

After the show, the plants were returned to the greenhouse, the scapes were removed and they were given a period of rest. This rest period was to help recover from the extreme forcing by enabling root development to continue. Temperatures were held at fifty-five to sixty degrees and water was supplied when needed and a shade thrown over the plants on bright sunny days. This treatment continued during the month of April and early May or until the pots could be plunged outside when the danger of frost was past.

Pots were plunged to the rim in a trench which had twelve inches of fresh cow manure and straw beneath them. Rotted manure was placed around the pots to hold the moisture and fertilizer which was applied to the manure once a month. Overhead sprinkling system provided water regularly during the summer. The plants grew well all summer produc-

ing ten to fourteen leaves. Pots were moved to the greenhouse early in October and dried off and held at fifty degrees temperature until they were repotted and made ready for forcing.

It is suggested that bulbs be forced every other season for exhibition purpose. After two seasons of continuous forcing the bulb cannot be relied on for exhibition quality flowers. Under normal greenhouse or window culture with adequate care of the plant after it has bloomed one can have quality flowers each season for years. Many of my seven year old bulbs are producing as well as they did the first time they were forced. The amaryllis is one of our most desirable pot plants. Its wide range of adaptability to environmental conditions makes it ideal for the estate greenhouse or apartment window.

GROWING AMARYLLIDS IN ILLINOIS

ARMYN SPIES, *Illinois*

Living in a colder climate than is suitable to the amaryllids outdoors, I must by necessity raise most of them in pots the year around. That means putting them out in the spring after frost and getting them in before the first killing frost in the fall. Some of the amaryllids such as *Hymenocallis* (subg. *Ismene*), crinums and zephyranthes can be planted in the open ground in the spring to bloom there during the summer. Others of the rarer types are planted in pots and nail kegs for ease in storing over winter and also to preserve the root system as much as possible so these rarer sorts get an early start.

I use about the same soil mixture for all the amaryllis, except the haemanthus, which gets a slightly more acid condition. To this mixture, which is on the sandy side, is added a little complete fertilizer, about a four-inch potful to a bushel, and also a half cup of superphosphate.

The hybrid amaryllis are left in the pots all year around. The soil in them is changed but once each two years. In the summer, they are put on the ground in rows, and coarse sawdust or shavings are heaped up around them until the brim of the pot is just covered. This will act as a mulch and prevent the soil from becoming too dry between waterings. This past summer broke all records for heat and lack of humidity in the air and I found it necessary to provide a light shade for them to keep the sun from burning the leaves. Several thicknesses of cheesecloth suspended high over the leaves, will help keep the sun from burning and at the same time, provide enough light and air circulation. The pots are watered as they need it, and once every two weeks, the pots are filled with a complete water soluble type fertilizer. The foliage is also sprayed about once every two weeks with the same solution. About every month or six weeks, the pots are given about a tablespoonful of an organic fertilizer, high in potash, to a six inch pot, and it is worked into the soil about an inch or so with a fork. When frost threatens, the pots are moved into the greenhouse and allowed to keep growing until such time as the leaves yellow and indications are that the bulb wants a rest, at that time they are taken into the cellar and allowed to rest. During

the rest period, no water is given except an occasional watering to keep the roots from drying too much. When the bud scape shows, or the leaves start to push up, the bulbs are brought into the light and allowed to start growth again. Before I had the facilities of a greenhouse, I used to bring the bulbs indoors to the window garden, or to a heated shed until the bulb ripened off. At that time, the remaining foliage was cut off and the potted bulbs were stored for the winter. (See Plate 5, lower left, and Fig. 10, for Amaryllis illustrations.)

Fig. 10. Dutch Hybrid Amaryllis (D-5a)—'Queen Superiora' (van Meeuwen), March 21, 1952; Flower rich red, darker throat. Photo by Armyn Spies.

Crinums are very nice pot subjects. The foliage is quite handsome whether the bulb is in bloom or not. Most of them grow quite large, and require a large pot or a nail keg. The larger bulbs usually put out two or three scapes under such culture. Other crinums are planted in the open ground when it is warm and danger of frost is over and allowed to bloom there. They are mulched with sawdust, and foliage-fed once every two weeks and also given a side dressing of an organic fertilizer high in potash. They require large amounts of water, and during the

drouth of this past summer suffered a little because I was not able to give them water at all times. They are dug, tops cut off, and stored in the basement over winter in lugs of dry peat moss.

Haemanthus (see Fig. 11) are very interesting amaryllids and also have foliage which looks good when plants are not in bloom. These stay in the pots all of the time and are grown in the greenhouse or the lath house under partial shade.

As each one seems to have its own cycle, it is allowed to rest under completely dry conditions, whenever indications show that a rest is near. Most of them bloom before the leaves show, or with the first leaves, but the *H. albiflos* is kept green all the time, and blooms with full foliage. *Haemanthus coccineus* is a particular favorite of mine—the bud is a

Fig. 11. Left, *Haemanthus carneus* (pink), and right, *Haemanthus coccineus*. Photo by Armyn Spies.

bright orange from the time it emerges from the bulb until it is in full bloom. The stem, as in most haemanthus, is green with brownish spots making the whole plant quite attractive.

Hymenocallis of the subgenus Ismene also get about the same treatment as do the crinums and zephyranthes that are grown in the open ground, except 'Sulphur Queen'. It is usually potted up and allowed to bloom either in the greenhouse or in the window garden to bring out the yellow color. In full sun, it fades out almost completely. In the winter, the bulbs are stored in lugs one deep and surrounded with peat moss. They are stored next to the furnace, so they are completely warm over the winter. It is at this time, that the bud forms inside the bulb and a warm temperature is required for this process.

A few *Hymenocallis occidentalis* are grown by me in pots although I suppose down South, they are regarded somewhat as weeds. They come into bloom while the weather outside is still cold, and add a tropical touch to the greenhouse. After blooming and warmer weather arrives, they are planted in the open ground also.

x*Crinodonnas* (syn.—x.*Amarcrinum*) are treated in much the same manner as the pot grown crinums, but usually remain green all year. They become large plants in time, especially if the offsets are allowed to grow, and require much room. The delicate pink coloring of the blooms is worth all the trouble one must go to to find room for them in the winter.

Clivias are easy to raise in this climate and are well worth a place in anyones window garden or greenhouse. During the summer they can be put under shady trees or in the shrubbery and in a normal rainy year will require but little care. The pots can be sunk to the rim in the soil. When frost is near, the pots are stored in a light, but not sunny window, and allowed to rest. The plant needs a low temperature at this resting period and it is not hard to find such a place here in the winter. Between 40 and 50 at this time is ideal. No water is given them except for an occasional cup or so every few weeks to keep them from drying completely. The bud usually emerges around the turn of the year at that time, they are given more water and a little more heat.

FOSLER & KAMP'S "DAYLILIES FOR EVERY GARDEN"

As we go to press, the excellent Illinois Circular 716 on "Daylilies for Every Garden", by Profs. G. M. Fosler and J. R. Kamp, arrived. This is a very valuable, up-to-date presentation of the subject that will be welcomed by all. Copies may be ordered from the Agric. Information Office, 110 Mumford Hall, Urbana, Illinois.

CRINUM MOOREI FORMS

L. S. Hannibal, *California*

After having collected variations of *Crinum moorei* Hook., for fifteen years it is quite apparent that there are two types producing viable seed to be found in English, Australian and Californian gardens. Despite the hundreds of seedlings grown yearly each type rigidly retains its own form. Intermediate types between the two seemingly do not exist, although crosses attempted in 1952 by the writer may disclose otherwise.

Crinum moorei var. *minor* is the smallest of the lot. It is partially summer deciduous. The bulb, foliage, scape, and floral parts are 60-70% the size of the more popular larger type of plant. Color of the blossoms of both "minor" and the larger type plant are RHS Phlox Pink (625/3) when grown in part shade.

Crinum moorei clone 'Frank Leach' (See Herbertia Vol. 10, P. 70, 1943, & Vol. 11, P. 305, 1944) should not be confused with the above forms. This clone, which is sterile, is 30% larger in all parts than the type species. The distinctive identification is that the flower tube is bent sharply just above the ovary and again just below the throat. The major length of the tube is straight. The flowers are much lighter than the (625/3) hue.

At present the writer is growing several bulblets of a little known type reported to be *C. moorei alba.* The seedling plants are not of sufficient size to permit flowering, but pigmentation on the radicle disclosed that they were not true albinos. Identification in relation to the others above is as yet unestablished.

Since identification of the *C. moorei* type, "minor", and the 'Frank Leach' clone are best identified by flower parts these are tabulated as follows:

Flower Part:	*C. moorei minor*	*C. moorei* (type)	clone 'Frank Leach'
Scape length	18-24"	24-30"	30-48"
Pedicel length	1-1½"	2¼-2½"	3½-4"
Tube length	2½"	4-4½"	5-5½"
Petal length	2½"	3"	4"
Tube curvature	uniformly curved	bow curve	bent as noted

GROWING AMARYLLIS

Mrs. W. D. Morton, Jr., *Louisiana*

In Amaryllis, the world of flower lovers have the most beautiful and spectacular bulb flower of Spring. A bulb which can be grown by any amateur or professional horticulturist, trained gardener, or hobby plantsman. There is perhaps no more universal spring bulb flower. It has size, shape and form, and above all, color. Amaryllis is one of the easiest bulbs to grow and keep in good condition, year after year. There is no limit to the Amaryllis bulb's life. Under proper culture, it renews itself annually, and barring accidents, it might live a thousand years.

October is the time to begin thinking about your Spring Amaryllis. Begin by preparing the beds with the proper soil. Any fertile soil, particularly the Camellia soil prepared by the nurseryman, with good drainage, and a fair proportion of humus, will give excellent results. Amaryllis do not like hard packed ground.

In November the bulbs begin to arrive. The Holland Bulbs are generally later, but they have been in cold storage, and as soon as they are put in the warm ground, begin growing immediately, and often bloom before they put on any foliage. In the South the open ground is best, and the plants stand the cold much better than those planted in pots. After planting the bulb one-quarter of it out of the ground, it will grow well, stand the heat and drought of the long summers, and in addition, will withstand winter cold.

In December you may add a little bone meal, or 5-10-5, working well into the ground, and then water well. There is very little to be done to Amaryllis through the colder months. If the cold kills the leaves, it is well to pull the leaves off, so the sour juice from the leaves will not run back into the bulb. Keep the bulbs well watered all through the winter, and water freely when they begin to bloom. Sometimes a second, and probably a third flower, will spring up from the bulb. When the bloom has faded, the stalk may be cut off at once, or allowed to remain and ripen seeds, if desired. You may propagate from seeds, off sets, or by cuttage. The first being the general method with all growers, and the way new hybrids are made. Offsets formed on the mature bulbs may be set out separately, and grown on to blooming size. Until the cuttage methods for Amaryllis were worked out in the last few years, offsets were the only way to increase stock of a clone, and this made the development of named clones a long and tedious affair. The seeds, offsets and cuttings may be planted in the same kind of soil that the Amaryllis bulbs are planted in.

During February give another feeding of bone meal or 5-10-5, and in March and April you will be rewarded with nice Amaryllis blooms (see Plate 9.). Seeds should be planted in flats, and kept damp but not too wet until they come up, which will be between three and four weeks. When they are four or five inches tall, reset in the yard, where they will grow faster, than if left in the crowded flats. Cuttage in Amaryllis

bulbs means to cut the large bulbs into two, three or four quarters, roll in sulphur and plant. The cut pieces will take root and grow well.

Dutch Hybrid Amaryllis (D-5b)—'Daintiness' (Warmenhoven), pink-flowered, as grown and photographed by Mrs. W. D. Morton, Jr.
Plate 9

Water freely while Amaryllis are in bloom, but don't neglect your Amaryllis once the flowers have faded. The bulb will be somewhat

emaciated by that time, and will require watering and feeding to rebuild its strength and to prepare it for bloom in another year. After flowering, the bulb should not be dried off. Widespread, but erroneous advice on this point has probably caused more bloom failure than any other single factor. The normal habit of Amaryllis is to make leaf growth right after flowering. Simultaneously with the development of leaves, the bud expands, and buds for the next season's flowers are formed within. You may discover the approximate number of stems developing in the bulb, by counting the number of leaves. In the axis of every fourth leaf, a primordial flower develops. Drying off at this period, would naturally hinder the production of foliage, and check the formation of buds. Therefore, continue to water your bulbs after they have bloomed. With certain strains, summertime flowers are not unusual. Protect your small seedlings the first winter; after that they will do well in the open ground. They will also do well in pots, but are less trouble growing in the ground. If you desire growing Amaryllis in pots, soak your pot from 12 to 24 hours in water, to make sure they are saturated thoroughly, and be sure of good drainage, by putting a half-inch layer of crushed crockery, stone or gravel in the bottom. Over this place your soil. Have your pot several inches wider all around the bulb.

The most interesting part of growing Amaryllis, is pollinating while the plants are in bloom. About the third day, the pistil is open and ready to receive the pollen. Place the pollen from the anthers on the stigma, then tie a small bag or wax paper around the bloom, so that insects will not bring in unwanted pollen.

If a few essentials are observed, Amaryllis are so easy to grow. Good bulbs are of first importance. The demand for named Amaryllis is steadily growing in New Orleans, and we are striving to make Amaryllis one of the most outstanding flowers in the South.

During July, August and part of September Amaryllis are dormant; they are having their rest period. In the South, it is not necessary to take them out of the ground, for a drying-off period, and they may be left in the ground.

Amaryllis growers have made wonderful strides in developing new solid colors and now have bulb treatments that insure bloom in December for Christmas when planted in November.

From the time the seeds germinate in the seed beds, the seedlings are subject to a certain degree of molestation by their natural enemies. Mole crickets are often common in the seed beds, and may cause considerable mechanical injury by burrowing around in the soil and cutting off the roots. Sowbugs are apt to be present, and they damage the young plant by eating off the tips of leaves. These crustaceans continue to feed upon the plants throughout the summer. They crawl up the leaves and feed on the tips. Weeds may become troublesome in the seedbeds. The most bothersome weed is the chickweed. It produces a viny type growth which may completely cover the young Amaryllis, and shut off the light. The most troublesome weed in the Amaryllis beds is a plant known as Wandering Jew. It thrives in rich damp soil so favorable to Amaryllis. It is a vigorous vine like plant. This weed has the tendency to overgrow

Amaryllis and shut off the light. As the plant grows older they become subject to the attack of an imperfect fungus known as *Stagnospora Curtisii*, which produces a condition commonly known as Red Blotch.

Larvae of a moth sometimes appears on the leaves in the spring. They are voracious feeders, and in a short time, eat up most of the leaves on a plant. Moles seems to have a strong affinity for Amaryllis beds, where earthworms thrive in great abundance. They cause a great deal of damage by burrowing among the bulbs destroying the roots of the plant. All of the enemies of Amaryllis may be counteracted by standard, approved methods. In spite of the numerous difficulties, the Amaryllis keeps on growing and blooming. So long as the soil conditions are kept favorable, the plant continues to thrive.

THE CAMMACKS AND THEIR AMARYLLIS

WYNDHAM HAYWARD, *Florida*

The Cammacks of Maitland, Florida are responsible for the creation and development of the Cammack Strain of Hybrid Amaryllis, the only strain in America offering home-grown named clones vegetatively propagated. Ida Luyten in Holland had first recorded a method of vegetative propagation for Amaryllis in the 20's and this was later re-published with elaborations in the early issues of Herbertia, the yearbook of the American Amaryllis Society, now affiliated with the American Plant Life Society. The Cammacks use a method based on the cuttage methods later recorded by I. W. Heaton and Dr. Hamilton P. Traub.

The Cammacks themselves are William and R. Seymour, father and son, a sturdy, practical pair of horticulturists and experimenters, from solid and substantial midwestern stock, who turned to Florida soil to make a living a quarter century ago. The elder Cammack and his late wife, mother of Ralph Seymour, came to Florida with their family in 1925, following their retirement after 17 years service as medical missionaries for the Congregational Church in the Southwest African field (Angola).

William Cammack, a native of Salem, Iowa, who now plans to retire this coming season from the Amaryllis business, after a quarter century, because of advancing years, has the happy gratification of having established the first commercial line of American vegetatively propagated (by cuttage) Amaryllis to obtain a nation-wide acceptance. As a matter of fact their Amaryllis have found their way to England, Canada and other countries in large numbers.

In recent years, since Ralph Seymour's return from several years service in World War II with the U. S. Army, the Cammack farm has been divided between the elder Cammack's Amaryllis cultures and the son's Gloriosa Lily plantings. The Gloriosa Lily business is taking over the picture for the younger Cammack, as he has specialized in the field and developed a strain which is widely known and in demand for cut flowers and tuber sales.

The Cammacks grew their original Amaryllis stock from top quality Mead Strain bulbs obtained from various sources in the late 20's and early 30's. They bought seed of Mead strain bulbs from the Rockett Bulb Farm, near Oviedo, from Bender Amaryllis interests, from the I. W. Heaton Farm, Frank Vasku, and others among the early growers of the Mead Strain Amaryllis in Central Florida. Maitland is a short distance north of Orlando and Winter Park, Florida.

As their stock increased, the Cammacks began to take an interest in the vegetative propagation methods which had first been used in Florida by I. W. Heaton, who introduced the orange-red clone 'President Roosevelt' in 1933, first shown at the 1934 Amaryllis Show in Orlando, and other varieties. They continued this vegetation propagation in their plantings until by the present time they have a list of nearly two dozen named varieties and selected types to offer their customers and the wholesale bulb trade. In recent years they have sold some of the named varieties by the hundreds to Northern dealers.

As explained by R. S. Cammack, the named varieties are propagated by cuttage in August each year. As high as 60 and as few as 2 or nothing have been obtained in various years as the progeny of a single bulb when cut up. The cuttings are sprouted in beds of peat and sand, sunk in the ground under lath or moss shade houses. The cutting medium is used year after year with careful sterilization between each planting.

Small bulbs produced from the cuttings are set out, usually under some form of moss shade house (Spanish moss on wires overhead) in the spring, and allowed to grow two or three seasons with careful weeding, cultivating and fertilizing. The Cammacks have found that conscientious sterilization of the soil in Amaryllis beds with DD, methyl bromide, or other fumigant is decidedly helpful in the production of healthy, sound Amaryllis bulbs in the shortest time. The possibility of nematode pests attacking the roots of Amaryllis in unsterilized soil is still under investigation by USDA workers and the question is an open one at this time. At any rate, the Cammacks report healthier, more vigorous roots and bulbs in treated soil.

The Cammacks have been propagating Amaryllis vegetatively since 1936, and their current list of named clones, largely in the decorative class, but with a few which are described as exhibition types, includes such interesting and attractive items as 'Salmon Queen', 'Princess Elizabeth', 'Margaret Rose', 'Maiden's Blush', 'Giant Near White', 'Wings of Snow', 'Florida Beauty', 'Cammack's Star', 'Fire King', 'Harvest Moon', 'Tartan', 'Mrs. I. W. Heaton' and 'Dark Red Bennet'.

William Cammack intends to sell out most of his bulbs and planting stock on withdrawing from business this season, and will retain only sufficient small size planting stock to enable him to re-establish himself in the business in a few years time if he finds a favorable opportunity at his new location. The son, R. Seymour Cammack, intends to devote his time to Gloriosa growing exclusively. Amaryllis growing is hard work and like all farming, replete with various risks of weather and insect pests.

The Cammack soil is a dark, Orlando Fine Sandy Loam type, on dry side, but the Cammacks have a large lake, (Lake Hope) clos hand and irrigation is practised as needed with pump and motor f the lake water. Intensive use of commercial fertilizers is the prac The father and son declare their aim in establishing the Camm strain was to produce a vigorous, attractive line of hardy Amary types in named clones which would be good as an outdoor strain a satisfactory for indoor culture except for top competition at the h flower shows. And even there, as at New Orleans and elsewhere t Cammack varieties when shown at their best have come away wi ribbons.

"We think we have as good an outdoor strain of hybrid Amaryll as there exists today," the Cammacks joined in telling this reporte Most of their bulbs are dug in November and December for their whol sale and retail trade. Much of the latter is by mail to states all over th country.

THE SANGSTER HYBRID AMARYLLIS

WYNDHAM HAYWARD, *Florida*

The king of field-grown Amaryllis today in the United States, and doubtless in the entire world, is a serious, conscientious and hard-work ing nurseryman and bulb grower named B. M. Sangster, who supplies from his acreage in the Conway section, Southeast of Orlando, Florida, some millions of the commercial Mead Strain hybrid Amaryllis bulbs annually to the jobbers and wholesalers of the American horticultural trade.

Mr. Sangster lives with his family in a beautiful area of rolling orange groves near the famous Lake Conway, about five miles from the Center of Orlando, a thriving city of some 55,000 people in the heart of the upper citrus country of Florida. The Sangster Amaryllis bulb cul tures are closely tied in with his citrus grove development and manage ment (see Fig. 12) through the 25 years since he first began to raise them.

Originally from the state of Georgia to the North, Mr. Sangster settled in the area where his farm now lies more than a quarter of a century ago. At first it was pure economy of effort that led him to grow his Amaryllis bulbs between the rows of trees in his young citrus groves. Later it developed into a consistent and efficient cultural pro cedure.

The land on which the Sangster groves and bulb plantings are grown is known as Orlando fine Sandy Loam, a rich, dark, farming type of soil, unusual in the Central Florida area, where so much of the com mon field land is the thin high-pine types of the Norfolk Sandy Loams. In low areas this grows good truck gardens and in the medium, and upper types of the soil, the growth of citrus trees is favored in the Conway area. There are thousands of acres of valuable young and bear ing groves in the region about Mr. Sangster's farm.

He and his family operate some 100 acres of grove of all ages at this time. When it is realized that this grove land has a value of $1,000 per acre and upward, it can be seen that with his millions of Amaryllis bulbs annually, Mr. Sangster is in the big business brackets. In addition to his grove and bulb cultures, Mr. Sangster and his family operate a citrus nursery growing 15,000 to 20,000 young trees at all times.

The Sangster Amaryllis stock is descended in the main from 1,600 bulbs which he personally purchased from the late T. L. Mead, pioneer

Fig. 12. Portion of Sangster young citrus grove near Orlando, Florida, inter planted with Hybrid Amaryllis.

Florida horticulturist (see autobiography in 1935 Herbertia) at Oviedo, Fla. Mr. Mead, who died in 1937, introduced the hybrid Amaryllis to the American bulb trade and was the founder of the so-called Mead Strain, most largely grown today under field conditions in Florida. This is a strain produced by millions of bulbs, mostly of decorative types of bloom, and having few exhibition types among its seedlings. It originated in the early decades of this century from fine European Amaryllis stock imported by the late Henry Nehrling of Gotha, Fla., another celebrated Florida plantsman of his time, from whom Mr. Mead obtained his start of Amaryllis stock.

These 1,600 bulbs were purchased for around $500, Mr. Sangster recalls, and were used as seed stock to enlarge his planting. Offsets were also carefully saved and grown on. For a number of years every effort was made to increase the Sangster stock in numbers to meet the trade demand, which was and is enormous. The Mead strain bulbs, usually in 2½ inch size or varying from 2¼ to 3 inches, according to the class of trade, are sold by the millions in department stores, seed stores, florists shops, chain stores, etc., mostly in the dry or dormant state during November, December to March. By that time most of them are beginning to show buds and must be planted.

When his stock reached large size, hundreds of thousands of bulbs, grown from seedlings and offsets, Mr. Sangster began to devote more time to the scientific study of his cultures and the quality of bulbs and flowers they produced. There were several factors which required constant study and attention. First was production,—the growing of a sound, healthy, vigorous and hard bulb, able to stand the hard knocks of shipment and weeks of storage in warehouse and on store counters. The bulb should be 2½ inches in diameter at least, although a certain trade will take a slightly smaller bulb where price is a major factor. Bulbs from 2 to 2½ inches in diameter will usually bloom, especially in the Mead Strain. Bulbs 2½ to 3 inches in diameter are regarded as sure bloomers. Dozens may be cut open in the Sangster bins without finding a blind one.

Under field conditions in Florida, growers have always found it difficult to produce a three inch bulb. The problem is easier for the Dutch growers with greenhouse beds under constant care. Mr. Sangster's bulbs remain in the full sun in the open air during the long Florida summer from March to mid-October with no protection from the elements. It is a matter of the survival of the fittest. No weaklings survive, which is not true in the Dutch cultures.

Growing Amaryllis in rows in the middles of the citrus groves requires more than hand cultivation. For years Mr. Sangster has used mule-drawn cultivators and weeders, but mechanization is now taking over and one of the two mules has been replaced by a tractor. For most of his field labor Mr. Sangster hires high school boys by special arrangement with the local schools—youngsters who are sincere, careful workers, and anxious to earn a few dollars every week for work after school hours and on Saturdays.

With these crews, whom he trains through the years, Mr. Sangster plants his Amaryllis in March, six inches apart in the row and the rows far enough apart for the necessary cultivation. The ground is in good condition by reason of the care taken to prepare it for planting the young citrus trees. He treats the land with basic slag to counteract the prevailing heavy acidity of Central Florida soils, but prefers to leave the pH at 5.5 to 6.5, just short of neutral. For fertilization he has worked out his own system of applications of castor pomace and mixed commercial fertilizers. He is a firm believer in the value of castor pomace as an organic fertilizer for Amaryllis.

For the production of his new stock, Mr. Sangster maintains a wire shade house partially covered with Spanish moss where he grows his seedlings, several thousand, every year, near his home, and has an open air bed nearby of several hundred selected type parent bulbs, some of them the original bulbs he purchased a quarter of a century ago from Mr. Mead. The seedlings are grown for one season from April and May planting in the shade house and are lifted and set out in the field the next March. He eliminates every seedling which has not made good growth in the year's time, anything below ¾ to 1 inch being destroyed.

In replanting his offsets from the bulbs in the field, Mr. Sangster also has made a serious effort to eliminate the offsets of small bulbs, to increase the size of bulbs in the field grown stock from year to year. The last two or three seasons, he has raised the crop of 3 inch bulbs to 30 per cent of the whole. The value of the bulbs increases with the diameter up to 3½ inch. Four-inch bulbs would theoretically be ideal but transportation costs and other difficulties enter the picture at such large sizes.

Mr. Sangster's bulbs include few exhibition types but a wide range of varying colors from dark reds to whites with slight red and pink markings. They are forced by florists for pot plants and cut flowers and sold over the nation by millions to bring a touch of color into the lives of Northern peoples during the spring when cold weather still stays outside.

In recent years Mr. Sangster has purchased Dutch Amaryllis of the Ludwig Strain and other strains to employ in hybridizing with his seed stock to raise the level of bloom quality in his Mead Strain bulbs. The effects are beginning to show in his latest field plantings.

Harvest time comes in the Sangster acres in mid-October. With his crews the bulbs are ploughed out and lifted into a waiting truck, by the hundreds, tops, offsets and all. The truck carries them to the bulb shed near his home. There women workers cut off the tops and most of the roots of all bulbs, which are sorted into the various commercial sizes, and the planting stock or smaller slabs and offsets set aside for storage until spring. With good work, the crews can handle an acre or two a day. At the present time he is growing about 50 acres of Amaryllis annually.

He finds that symbiotic culture of Amaryllis and citrus pays off with better bulbs and bigger citrus trees for the few years that he employs the middles between the tree rows for the bulbs. After three or four years, the trees have made such growth that he has to move on to new and younger acreage where the trees are smaller. This involves a steady program of citrus land clearing and grove planting, which becomes automatic, so to speak.

So when you go to your "dime store" or your seed store for a casual Amaryllis bulb for a friend, give a thought to B. M. Sangster laboring among his citrus trees in Central Florida. He worked hard to create that bulb for you.

OUTDOOR AMARYLLIS CULTURE IN LOUISIANA

Jo N. Evans, *Louisiana*

"It can't be done." That was all that I needed to make me want to try growing the Dutch hybrid amaryllis as a garden flower. (I have no set-up to grow pot plants). I have been growing, as garden flowers, local seedlings of the hybrid Amaryllis for many years and have had no trouble with them.

The first group of the Dutch clones planted out were 'Fidelity', 'Invincible', 'Doris Lillian', 'Roselind', 'Ludwig's Scarlet', "Ludwig's Dark Red," 'Snow Queen' and 'Mount Tacoma'.

These bulbs were sent to me in January and the buds were already showing. I held them in a cool place out of the ground as long as possible. I planted them, the last of January, in very rich soil and mulched them well with cypress leaves. However, they came into bloom the last of February, some on stems that were too short and some with what is commonly called "fire disease". They were beautiful despite these difficulties.

Knowing that I would have to hold the bulbs dormant all winter the next season, I kept them growing as much as possible all summer. After the cold weather was over I took the mulch of leaves from around them and mulched them heavily with old barnlot fertilizer mixed with a heavy application of cottonseed meal. The bulbs are growing under cypress trees where they have filtered sun, they are kept moist and about three times during the summer the mulch of fertilizer was renewed and an application of 8-8-8 was mixed with it.

This all adds up to a few simple facts—plenty of food, plenty of moisture and protection from extreme sun. The bulbs grow and the leaves are from 27 inches to 36 inches long. With the first heavy frost we cover them about 12 inches deep in cypress leaves and let the amaryllis leaves freeze down.

The bulbs are now left undisturbed for the entire winter. Two years ago our temperature went to zero for three nights and did not come to 32 degrees for a week. Every winter we have one or two times that the temperature drops to 16 degrees.

I do not uncover the bulbs until the buds are about four inches tall under the mulch, then I just pull the mulch back a little and leave the protection around the bulb.

The second year they had little or no "fire disease", or "red rust", and had long stems. They were a sensation in the garden. Each year I add more of the named clones to my collection.

My pure white hybrid amaryllis have performed just as well as any of the others and it is amazing what they can take in the way of spring storms and cold without being damaged, when well protected as I have described.

GROWING AMARYLLIDS IN SOUTHWESTERN ARIZONA

PHILIP G. CORLISS, M.D.,
Regional Vice-President, A. P. L. S.
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Bulbs are particularly suitable for gardening conditions in the arid alkaline southwestern part of the United States. Of the three "families" whose bulbs are most widely grown by gardeners in our region (the amaryllis, iris, and lily families) I believe it is safe to say that the bulbs of the amaryllis family are, on the whole, the most satisfactory.

The relentless sun, blistering winds, and heavy alkaline salts in the soil, are hazards which are more successfully met by bulbs than by other plant forms. In my garden and in those of my neighbors the white akali produces a hard crust which must frequently be mannally scraped from the soil surface. Good drainage is almost universal as there is no layer of rock or hardpan near the surface. In either the heavy clay type of soil common to our river bottoms or the sandy soil of the mesas, the alkali may be scraped off the top or leached out by heavy watering so that bulbs which are planted beneath the treacherous soil surface escape the alkali, sun, and wind.

Since flower-growing is new to the southwestern lands reclaimed from the desert and because of my project of supplying sets of color slides to garden clubs all over the world, I have tried to grow, for purposes of report and photography, as many kinds of flowers as I could obtain and handle. While it is true that my major hybridizing efforts have been concentrated on one member of the lily family (hemerocallis) and one of the iris family (spuria iris), it is also a fact that I have probably had more increase and less failures with bulbs of the amaryllis family than with those of the other groups. I am a little like Tom Craig (of whom Peg Debagh has said, "if a dandelion blooms, the master hybridizers it") in that every flower presents a breeding challenge, and I am raising seedling amaryllis and daffodils, too.

Growing flowers in a land reputedly closer to the devil's abode than any other part of this country has taught me to respect the importance of regional performance. Our temperatures in the Yuma Valley are like those of southern Florida and the Rio Grande Valley of Texas, but our climate is unique in that we have more hours of sunshine and less humidity. The average sunshine for each year is OVER ninety per cent of possible, while the average mean humidity is just under forty!

I do not grow plants or seedlings in pots or pans, as it is too difficult to prevent the accumulation of alkaline salts or to provide adequate humidity. All of the following reports, therefore, are based on my experience in growing plants out of doors in the ground with no artificial protection from heat or cold.

AMARYLLIS. Through the kindness of several friends, I have been privileged to grow a number of the new Dutch hybrids, McCann's doubles, and some select American strains. The first year's flowers tend

to have shorter stems than are seen on specimens grown in pots in the north because of our early hot weather. There is the usual sparcity of bloom the second year, and the eventual increase or loss, depending on how the variety "takes" to our regional conditions.

Because plants rarely have a rest in our climate (as there are some kinds of flowers in every bed that grow at all times of the year and from which water and food cannot be withheld) I thought I might improve the flowering habit by digging the amaryllis bulbs when the weather got relatively cool in the fall. The bulbs were placed in cardboard milk cartons in the lath house and allowed to dry out for about two months. I could not see any difference in the performance of bulbs so lifted and those allowed to grow all year.

Both McCann's doubles and the California strains from various sources are more vigorous than the Dutch hybrids, and their flowers are certainly large and brilliant enough to satisfy any gardener. Nevertheless, the open forms, enormous size, and intriguing color combinations of the Dutch hybrids are so fascinating that they warrant the extra attention they demand.

My preference in all flowers is for the singles rather than the doubles, for next to the color, I think the center of the flower is its most important visual feature. However, the McCann double amaryllis excite the greatest comment from garden visitors.

Amaryllis set seed easily and profusely. Whether refrigerated all summer or stored in cartons and subjected to summer heat, the seeds germinate readily if I plant them in sufficient peat moss to prevent their being "pickled" in our alkali.

ALSTROEMERIA. My only purchased tubers came from Tom Craig some years ago—the striking green-and-red *A. pulchella* of Brazil. I remember asking Mrs. Craig if she thought I could really grow them, and she replied that they would do alright for me if I found a place "they liked". I must have found such a place, for I now have three large clumps that require checking back several times a year.

The pastel types commonly called "peruvian lilies" I raised from seed sent me by Mr. Frank Leach of Diablo, California. Had I known they preferred the altitude of the Andes I might never have attempted to grow them, but of several places I planted the seed, they took a liking to the shade under a lime tree and continue to grow lustily each winter from their summer-dormant tubers.

AGAVE. Need I comment on how agave takes to the desert? The one "century-plant" I permitted in the garden bloomed after crowding many other things for about ten years. As the flower rose to its thirty-odd feet of height one could almost see it grow. It was an engineering feat of no small proportion to remove the "corpse" from the center of a crowded garden. Getting rid of its offsets was an annual task of some magnitude, too.

BRUNSVIGIA. *Brunsvigia rosea* (Cape Belladonna) does extremely well in the southwest. I am usually in other parts of the nation when they are in bloom, but my caretakers are always greatly impressed by the enormous pink "lilies" that suddenly appear in various parts of the

garden, and I sometimes return early enough in September to see the last of their glory.

CRINUMS. Surely there is no less exacting flower than the crinum, for our region, at least. Massive clumps in the poorest soil in my garden get practically no care except an occasional support for a flower-heavy stalk. Without the support, the flowers just lie on the ground and keep on blooming all summer, anyway. Best of friends are 'Cecil Houdyshel' and 'Ellen Bousanquet' who take turn about each year putting on the heaviest bloom. *Crinum* Moorei is least vigorous, and the two *Crinum x powellii* are quite satisfactory, if less showy than the other two "friends".

CYRTANTHUS. I can report moderate success with cyrtanthus, but my small planting shows no sign of intense vigor. *Cyrtanthus mackenii* is doing well and shows signs of increase but *C. lutescens* does not seem too happy.

DAFFODIL. Thanks especially to Jan DeGraaff, and Peter de Jager, Jr., I have had the opportunity of testing a great number of daffodils.

The paper-white narcissus and "Chinese Sacred Lily", grown always in the garden, start blooming in November and continue until after 'Tunis' starts the "big show" in late January. Despite our early and intense heat, there are always some daffodil blooms until I leave for the summer, even well into July.

All classes do quite well, but there are variations in the performance of named hybrids. The least vigorous classes are the double, poeticus, and miniature rockery types.

Of many varieties tested, the following are worthy of special comment for growing conditions in the southwest: 'Tunis' (leedsii) The earliest of the hybrids. 'February Gold' (cyclamineous hybrid) early, vigorous, colorful. 'Diotima' (trumpet) the largest daffodil flower I have bloomed. 'Actaea' (poeticus) its bright red eye makes it most showy. 'Trevithian' (jonquil hybrid) twelve bulbs gave eight weeks of continuous fresh bloom. 'Quiriness' (large cup) Largest and showiest of yellow cups. 'Silver Chimes' (triandrus hybrid) is more vigorous though not as lovely as 'Shot Silk', but not as vigorous as 'Moonshine'. 'Winter Pride' (cluster) most vigorous and showy of tazettas. 'Snow Sprite' (double) small for its class, but to me the most attractive and vigorous double. 'Moulin Rouge' (double) deepest color of any doubles I grow. 'Mrs. E. H. Krelage' (trumpet) largest and whitest of white trumpets for me. 'Alasnam' (trumpet) the best-performing yellow trumpet. 'Yellow Cloud' (trumpet) a yellow trumpet that is my favorite because the trumpet looks UP instead of out or down.

Other varieties which have been outstanding and are recommended for the southwest are: 'Love Nest', 'Burgomaster Gouvernor', 'Toronto', 'Flower Record', 'Gertie Millar', 'Aranjuez', 'Mrs. R. O. Backhouse', 'Ben Hur', 'Geranium', 'Lanarth', 'Mrs. Nettie O'Melveny', 'Nova Scotia', 'Mount Hood', 'Rustom Pasha'.

EUCHARIS. I have not yet succeeded with eucharis, but two plantings are still alive.

GALANTHUS. My snowdrops have come misnamed, but since we have more exciting flowers in bloom the year around there is not a great need for these tiny white "heralds of spring".

HYMENOCALLIS. A giant white-flowered species which has been in cultivation in the Yuma Valley since I came here over twenty years ago does better than the species of the subgenus *Ismene* for me. It produces massive clumps of handsome bright green foliage which remain fresh all twelve months of the year, measuring even in January over three feet in length. The flowers appear in late June and July and have a diameter of eight inches.

IXIOLIRION. I am growing some of these bulbs for the first time this season. Apparently they will prove satisfactory.

LEUCOJUM. The snowflakes are very satisfactory, increasing well, requiring no care, and blooming over a long period each spring.

LYCORIS. I am always away when the lycoris bloom in my garden. They do not thrive for me as they do for some of my neighbors, but the persistence of bulbs and foliage of *L. radiata* and others leads me to believe that they probably do well in this region.

NERINE. I take nearly as much pride in boasting that I HAVE bloomed nerines in my garden as I do from my one success with *Iris alata*. The nerines have practically disappeared now, however—both the fine hybrids from the Reinelt-Bauman (etc.) California strain and the imported species. My most recent failure was with *N. filifolia*.

PANCRATIUM. I have two plantings of *P. maritimum* and the one in full sun is by far the most vigorous. This lovely pure white flower is one of my greatest favorites and I hope some day I will have sufficient increase to provide a stunning display.

SPREKELIA. *Sprekelia formosissima* never fails to draw cries of delight when exhibited at flower shows. It grows well but flowers less for me than for my neighbors.

ZEPHYRANTHES. With the possible exception of some of the daffodils, the fairy lilies seem to be the happiest amaryllids in my garden. The yellow ones are the least vigorous. The pink- and rose-toned ones multiply readily and bloom as often as one stops and starts the water. The white species do best of all as regards increase, but do not bloom as frequently as the pink- and rose-toned flowers.

CONCLUSIONS: The conclusions to be drawn from my experience in growing amaryllids in the southwest are—

(1) Most members of the amaryllis family are excellent garden subjects in this region.

(2) They are relatively unknown and untried by the average southwestern gardener and nurseryman.

(3) It is to be hoped that there will soon be more widespread use of amaryllids and other plant forms suitable to the climate of this region and less futile effort to succeed with material better adapted to colder areas. Typical of common garden errors here is to plant roses budded on "cold-hardy" rootstocks rather than the vigorous but cold-tender stocks which are needed for local success.

THE USE OF SPAGHNUM IN AMARYLLIS CULTURE

WYNDHAM HAYWARD, *Florida*

The use of common sphagnum moss as a component of potting soil for growing Hybrid Amaryllis bulbs is reported in this paper because of the remarkable results observed from its use over a period of two years in the way of restored vigor, thrifty growth, size of bulb produced and thrifty root development.

The report is preliminary to further studies, and all rights to the procedure as herein described, subject to future patent procedure or other protective action, are reserved. As a simple progress report, the paper is expected to have interest for research workers and others engaged in the growing of Hybrid Amaryllis and other bulbs, as well as possible application in home and commercial cultures.

One of the great problems in the home and commercial cultures of both hybrid and Amaryllis species is that of the proper composition of the growing medium, its need for porosity and looseness of the particles for proper root growth. This is besides the necessity for proper requirements of moisture, temperature and fertilization.

In an early article in Herbertia, Vol. 4, 1937, the writer reported growing Hybrid Amaryllis bulbs in non-drained cultures of pure peat moss, a very porous medium, with reasonable success and good rooting. In recent years there has been an increase in the study of the apparent anti-biotic effects of sphagnum moss when used in plant culture. Leaflet No. 243 of the U. S. Department of Agriculture, entitled "Sphagnum Moss for Seed Germination" 1944, discusses the growing of seedlings in sphagnum moss, stressing freedom from loss by attacks of damping-off fungus during the growing period.

This paper, by V. T. Stoutemyer, A. W. Close and Claude Hope of the Division of Plant Exploration and Introduction, Bureau of Plant Industry, Soils and Agricultural Engineering, USDA, states that "excellent growth for an indefinite period has been obtained with plants transplanted in sphagnum and watered occasionally with nutrient solutions."

The present experiment may be described as an extension of that procedure. Cecil Houdyshel, in an article, "Want to Know About Amaryllis" in the November 1953 Flower Grower Magazine, describes a common procedure among Amaryllis growers, amateur and commercial, that of planting a stubborn Amaryllis bulb in "pure sphagnum moss, more acid than peat," to make them grow and root. "They grew at once," he reports. He recommends more study of this rooting situation.

The Stoutemyer et al bulletin reports that "the acid-reaction of the sphagnum may be a factor in control" of damping-off fungus, "but it does not explain the results entirely, as severe dampening-off has often been found under identical conditions with soil mixtures having the same reaction."

The present investigation began two years ago when the writer planted several dozen Dutch hybrid Amaryllis in gallon cans with ade-

quate drainage to stand the Florida summer rains. A one-inch layer of Spanish moss fibre was placed in the bottom of the pots, a 2-inch layer of sphagnum moss was packed into the can on top of the Spanish moss fibre, the bulb set was then in the center on top of this, and the container was filled in around the bulb with coarse white building sand in some cases and with the usual potting soil for Amaryllis in others. Those with the pure sand were fed occasionally with a balanced nutrient solution (Hy-Gro). The compost was 1/3 sandy loam, 1/3 sand and 1/3 leaf mold with some rotted manure added, plus a small quantity of commercial 5-7-5 fertilizer.

Rooting of the bulbs was strikingly excellent in the cases of the sphagnum and sand cultures, and reasonably good in the cases where the usual potting soil was employed. Only fair results had been obtained previously with the rooting and growth of the Dutch hybrids in outdoor cultures using the customary potting soil or compost entirely, in well drained pots or cans. On the basis of the results obtained with the sphagnum and sand, it was presumed that part of the trouble lay in poor drainage, as the heavy summer rainfall in Florida puddles the usual potting soil in ordinary pots in Amaryllis cultures, in spite of careful drainage precautions. Possibly this deprives the roots of air or oxygen for proper growth.

At any rate, a second and more comprehensive trial was run in the spring of 1953, using more than 200 left-over Dutch hybrid Amaryllis of the excellent Ludwig and Warmenhoven strains, bulbs that are prevailingly found difficult to root well and re-establish in thrifty fashion after their first potting. These left-over bulbs included no choice specimens, but were all the odds and ends of hundreds of imported bulbs, small sizes, odd shapes, bulbs which had been injured by cold and damp enroute from Europe, etc.

A special compost was made of approximately half coarse white building sand, from lakes, and half milled sphagnum moss, finely pulverized by the manufacturer of this special type in Wisconsin for seed culture. The proportions were about 50-50 by volume. The sphagnum was well packed into the measuring pails during mixing. To this when well mixed were added small portions of wood charcoal chips, of minute size, such as are used in chicken feeds, small portions of finely sifted leaf mold from piles of rotted oak leaves, containing no earth or soil, and a small amount of the common dried, pulverized and sterilized stockyards cow manure (Wizard Brand) available at all fertilizer stores.

No definite quantities of these added materials can be released at this time, as the matter is still under study for further experiments. But in almost all cases, or at least 95 per cent of the Amaryllis bulbs in the experiment, made good growth—of roots, leaves and bulbs during the summer in the lath house. Some bulbs produced as many as 14 large long leaves, which were held firmly erect, until they died away in the Fall. Many bulbs doubled in size, and virtually all that were in unfavorable condition when planted, developed good root systems and foliage. The pure whites, as expected, made the slowest and least leaf

and bulb growth, but mostly made good root systems. These remain on the bulb for weeks after removing the bulbs from the cans. All bulbs were potted as previously indicated in gallon tin cans, obtained from restaurants and schools, carefully cleaned. Four to six drainage holes were punched in the sides of the cans with a beer can opener.

There was occasional feeding, about once a month, with some nutrient solution (Hy-Giro), but no particular effort was made to perform this with regular and conscientious precision. The weather in Central Florida in the summer, 1953 was warm and humid, with heavy rainfall, some 20 inches being recorded during August, about 10 inches each in July and September, or slightly more. A few times the bulbs were watered by hand with a hose when dry, but not consistently. The pots were weeded carefully when any weeds grew. Toward close of the experiment they were shown to Prof. Alex Laurie, emeritus Professor of Floriculture at the University of Ohio, now in business at Eustis, Fla., who expressed his amazement at the foliage, bulb and root growth. He has agreed to cooperate with the writer in checking the results of further experiments.

PESTS OF AMARYLLIS AND THEIR CONTROL

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The known information on pests attacking amaryllis was published twenty years ago in the first Yearbook of the American Amaryllis Society. It seems appropriate to bring the information on the amaryllis pests up to date for the benefit of both old and new members of the Society.

Amaryllis plants are attacked by a number of pests, including both insects and mites. The plants grown in the fields or gardens may be damaged by different pests than those grown in the greenhouse or conservatory. Reddish spots and streaks on the leaves and flower stems appear after the feeding of certain insects and mites. The flowers, bulbs, and roots may also be damaged.

Insects and mites causing spotting of leaves and bulbs: Reddening of the leaves and bulb scales of amaryllis usually follows injuries caused by the feeding of insects with sucking mouth parts or by mites.

In both greenhouse and field several species of thrips, including the banded greenhouse thrips (*Hercinothrips femoralis* (Reut.)), the greenhouse thrips (*Heliothrips haemorrhoidalis* (Bouché)), the flower thrips (*Frankliniella tritici* (Fitch)), and the gladiolus thrips (*Taeniothrips simplex* (Mor.)), feed on the leaves and flower stems by puncturing or rasping the surface cells and sucking up the juices. The adults are slender-bodied insects about 1/16 inch long and light brown to nearly black; the larvae are orange to pale yellow. The gladiolus thrips, which is differentiated from the others by the cream-colored band across the middle, apparently feeds, to only a slight extent on the foliage, but

causes such severe injury to the bud that the flower opens imperfectly. These thrips may be controlled by weekly applications of dust containing 5 percent DDT or similar mixtures of chlordane or dieldrin.

Some insects puncture the tissue and suck out the juice from beneath the surface, and the reddened areas may be more localized. In the field the potato aphid (*Macrosiphum solanifolii* (Ashm.)) sometimes colonizes on young leaves and buds. In the greenhouse the citrus mealybug (*Pseudococcus citri* (Risso)) and the grape mealybug (*P. maritimus* Ehrh.) are often found in cotton masses, particularly in the crevices between the leaf bases and on the bulbs. A third mealybug, *Trionymus lounsburyi* Brain, has been found on amaryllis in Pennsylvania and California, and a fourth, *T. amaryllidis* (Beh.), occurs in Persia. The hemispherical scale (*Saissetia hemisphaerica* (Targ.)) and the soft scale (*Coccus hesperidum* L.) are sometimes found on the foliage and on other parts of greenhouse-grown amaryllis.

The aphids and the younger stages of mealybugs and scale insects may be controlled with a spray containing 1¼ teaspoonfuls of nicotine sulfate and 2 tablespoonfuls of soap chips in 1 gallon of water. For more effective control of the mealybugs and scales a spray containing 2 teaspoonfuls of 50-percent emulsifiable malathion in 1 gallon of water may be used in the greenhouse or field. If malathion is to be used on house plants, they should be taken outdoors for spraying.

The two-spotted spider mite (*Tetranychus bimaculatus* Harvey) pierces the epidermis of the leaf and draws out the liquid contents of the cells. Areas so injured at first become pale, but later turn rusty red, much as when injured by thrips. These oval eight-legged mites are yellow or red with two brown spots, and about 1/50 inch long. They usually congregate in large numbers. Their shining round eggs are found in depressions on the underside of leaves, generally covered with protecting webs.

Spider mites are controlled with the malathion spray suggested for use against scales and mealybugs. Where only spider mites are present, or for plants in the home, a miticide such as Aramite or DMC is preferable. Aramite in a 15-percent wettable powder should be used at the rate of 2 pounds per 100 gallons or 4 teaspoonfuls per gallon, and DMC in a 25-percent emulsifiable liquid at 1 pint per 100 gallons or 1 teaspoonful per gallon.

The bulb scale mite (*Tarsonemus laticeps* Halb.), a common pest of narcissus, was first recognized in 1929 as a pest of amaryllis in certain greenhouses in Germany. The microscopic mites are white when young but caramel-colored as adults. Infestations of this mite are indicated by the appearance of reddish spots or streaks on the leaves as they emerge from the neck of the bulb. The reddish lesions elongate as the leaves grow, and may attain several inches in length. The reddening also extends into the bulb, where great numbers of the mites and their eggs may be found. The mite population usually remains at a low level on plants grown in the field, and their presence may not be recognized. They do not increase markedly on the bulbs in dry storage, but do move from

bulb to bulb. When the bulbs are brought into the warm humid greenhouse, the population increases rapidly.

Sprays are ineffective against these mites because of their protected locations within the bulbs. Immersing the harvested bulbs in water for 30 minutes at 110° F. will destroy the mites. After this treatment the bulbs should be allowed to cool gradually before they are planted.

The bulb mite *(Rhizoglyphus echinopus* (F. & R.)) and a related species, *R. solani* Oud., frequently occur on many kinds of bulbs, including amaryllis, but may be barely seen with the naked eye. These pearly white mites are found burrowing into the roots, scales, and stems of plants that are yellow and sticky. They attack only weakened or rotting bulbs.

Bulb mites may be destroyed by the hot water treatment described for bulb scale mites. Since this pest is not known to damage healthy bulbs and plants, it will practically disappear if defective amaryllis bulbs and plants are destroyed.

Insects devouring foliage and flowers: In the southeastern part of the United States grasshoppers, particularly the eastern lubber grasshopper *(Romalea microptera* (Beauv.)), feed on the foliage and exposed bulbs of amaryllis. Individual plantings may be protected if surrounded by a trench with straight sides dug to about 1 foot in depth. Treating infested plantings and surrounding vegetation with a 5-percent chlordane dust will destroy this pest.

In Florida the blister beetle *Epicauta strigosa* (Gyll.) feeds on amaryllis flowers. This insect and related forms injure many crops. These blister beetles are recognized by their slender bodies and black coloration, sometimes striped with gray or yellow. They appear suddenly in large numbers in midsummer, cause severe damage for a short time, and then disappear just as suddenly. To control blister beetles apply a dust containing 5 percent of DDT.

Certain brownish or grayish velvety caterpillars belonging to the cutworm family feed on field-grown amaryllis. *Xanthopastis timais* (Cram.), known as the Spanish moth or convict caterpillar, devours the foliage. This insect occurs from Maine to Brazil and is common in our Southeastern States. The egg, larval, and pupal stages last 5, 25, and 30 days, respectively, and the adults live 8 to 10 days. Eggs are laid in large groups on the lower leaf surface, and the larvae are gregarious. The insect pupates in the soil. In Brazil it seriously injures leaves and bulbs of amaryllis. It also attacks *Pancratium*, *Eucharis*, *Fittonia*, and many other ornamentals.

In Australia, Formosa, and some other parts of the Far East, caterpillars of *Brithys crini* (Fabr.), *Noctua dominica* (Cram.), and *Calogramma festiva* (Don.) damage the leaves of amaryllis, lilies, crinum, narcissus, and *Rohdea japonica*. *B. crini* spends the winter as *pupae* in the soil, and the adults emerge the following spring. In Germany the privet sphinx *(Sphinx ligustri* L.), a large, light-green caterpillar striped with violet and white and attaining a length of 4 inches, devours the foliage of amaryllis.

In Brazil efforts to control the convict caterpillars with lead arsenate, 3 pounds in 100 gallons of water, were unsatisfactory, but good results were obtained when 2 pounds of paris green was added to the spray. A 5-percent DDT dust will control this caterpillar as well as others of this type.

Insect burrowing in the bulbs: Larvae of the narcissus bulb fly (*Lampetia equestris* (F.)), long known in Europe as a pest of narcissus and for shorter times in North America and New Zealand, also attack amaryllis, as well as *Habranthus*, *Vallota*, *Eurycles*, lilies, *Galtonia*, and Scilla. The yellow and black adults, which resemble bumble bees, emerge in the spring and lay eggs at the base of the foliage. The hatching larvae descend to the bulbs, enter between the leaf bases, and feed near the center of the bulbs. The mature larvae overwinter in the bulbs and leave them early the following spring to pupate in the soil. Bulbs dug in the fall for indoor culture may contain the large, legless, maggot-like larvae. Infested bulbs usually "give" to pressure of the hand, or the leaf base is found to contain an entrance hole. Foliage of infested plants becomes sickly, and the entire bulb may disintegrate.

For many years the only control for bulb flies was to immerse infested bulbs in hot water, as for the bulb scale mite. Now the bulbs may be protected from infestation by soaking them for 10 minutes in water containing 2 tablespoonfuls of a 25-percent heptachlor or aldrin emulsifiable concentrate per gallon. The residues of these insecticides remain on the bulbs over winter and destroy the young larvae as they attempt to enter the treated bulbs.

The lesser bulb fly (*Eumerus tuberculatus* Rond.) and the related species *strigatus* (Fall.) are widespread in America and Europe. Their size approximates that of the house fly, and both adults and larvae are considerably smaller than those of the narcissus bulb fly. The adults are black with a metallic luster. The larvae occur in large numbers in a single bulb. They seem to prefer bulbs weakened by the narcissus bulb fly, mites, or disease. Heavily infested bulbs usually disintegrate, but those containing only a few larvae may be detected only by pressure with the hands. Because these flies seek out only weak or injured bulbs for oviposition, no control measures seem warranted other than to plant only vigorous, healthy bulbs.

In Africa and Europe, large fleshy, whitish grubs of the weevil *Brachycerus* sp. have been found hollowing out the interior of amaryllis and other bulbs. No methods for its control are known.

Preventive measures: As many of the pests affecting amaryllis also attack other bulbous crops, the amaryllis plantings should be segregated as much as possible; also sites recently used for such crops should be avoided. Weeds serve as food for thrips, grasshoppers, cutworms, and spider mites; therefore, the plantings and surrounding areas should be kept free of weeds. Good culture to maintain vigorous growth and the elimination of weak or diseased plants and bulbs will reduce infestations of several of the pests.

Precautions in the use of insecticides: In handling insecticides, avoid extended contact with the skin or inhalation of the fumes. If parts

of the body become wet with spray solutions, wash thoroughly with soap and water, and change clothing. Follow the manufacturer's directions in the use of all insecticides.

THE BROAD MITE OF AMARYLLIS

C. Lloyd Burlingham, *Florida*

The broad mite, thought to have been introduced into this country from Europe, is so small that often it can be seen only under the microscope. It lives in the base of the bulb, though sometimes encountered between the layers of the bulb. The growth of the bulb is slowly retarded, and the root system eventually killed. A mature bulb is sometimes destroyed in eighteen months.

Some symptoms indicating the presence of mites are red streaks on the base of the bulb, an excess of red fire on the stem of the flower stalk, twisting or abnormal bending of the flower stalk or leaf, or anemic looking blossoms. An even more definite sign is dark discoloration at the base of the bulb, which usually is moist, and in advanced stages, slimy. It is believed the reddish spots and streaks on the leaves, often known as red rust, are result of broad mites. In fact, some enthusiasts claim that almost any abnormality of growth of leaf, spathe, or blossom is due to the mite.

Roy Howard (Mass.) used a 40% nicotine oleate solution obtained from the Perry seed store in Boston. Three teaspoonfuls of the nicotine oleate solution were mixed with one gallon of water, to make the proportion 1:400, and the bulb was soaked for ten minutes at 122 degrees Fahr. After treatment any foliage on the bulb promptly died. In the spring the bulb may then be set in the garden, or in the winter it may be repotted and placed where it can get bottom heat and good sun, but not too much water. Some difficulty may be expected in rooting, and potting the bulb temporarily in damp spagnum moss may be advised. Mr. Howard in every case saved the bulb, though there was some retardation of growth.

Durward G. Merritt (S. C.) mixed 25 grams of sodium selenate with three gallons of water, and sprinkled it on 1800 quart tins containing year old amaryllis seedlings as well as on some mature Dutch amaryllis. He then sprinkled five gallons of water to wash the chemical from the leaves. As the tins were closely set, he believes little of the sodium selenate was lost between the tins. He used a slightly stronger solution on a few bulbs, which promptly lost their foliage. He believes now that it might have been better to apply the solution directly to the soil rather than to the leaves. It should be borne in mind that this was a single treatment, and it might be damaging or even fatal to repeat too soon. There is some difference of opinion whether a single treatment is satisfactory, or several successive treatments of a weaker solution, are better. Mr. Merritt was not treating specifically for mites, but he found no visible live suckling insects on his amaryllis for three months after treatment.

Armyn Spies (Ill.) uses a course of three treatments. He loosely fills the larger half of a five-grain gelatin capsule (obtainable from any drug store) with sodium selenate and mixes it in a gallon of water. Metal containers should not be used for the solution, but glass or glazed pottery. For African violets or other plants more delicate than the amaryllis, six quarts of water should be used with the contents of the capsule. The solution should not be used when the soil is dry and in need of water, but when already moist. Excessive amounts should not be used otherwise too much will run out of the bottom of the pot. Three treatments are given two weeks apart, and then no further treatment will be required for any purpose for at least three months. Mr. Spies believes that, using this strength of solution, a month will be required to kill all mites.

It is understood that Mr. Klein of the amaryllis section of the Garfield Park Conservatory, Chicago, is experimenting with the use of sodium selenate in combating the broad mite, and it is to be hoped that other qualified persons will also experiment to determine the extent of the incidence of the broad mite in amaryllis in this country, just what abnormalities of foliage, spathe and blossom may properly be ascribed to the mite, and the best method of combating it.

EXPERIENCES IN THE PROPAGATION OF DUTCH AMARYLLIS

JOHN T. WEISNER, *Florida*

About six years ago, the writer became interested in growing hybrid amaryllis. His principal interest was in the development of self-colored flowers of the Mead strain. In the next three years (from the first batch of seedlings) several fair reds and three near white amaryllis were developed. However, nearly all interest in the Mead strain was lost on sight of the first Dutch amaryllis. After seeing the Dutch blooms the writer's dominant desire was the acquisition of some of these magnificent flowers. This interest in the Dutch strain developed to such an extent that he just had to have several of the Dutch bulbs. However, upon inquiry as to the best place to purchase Dutch stock, the answers repeatedly were Dutch amaryllis were fine, but they are green-house plants and will not live in Florida. However, against this advice, about 100 bulbs were purchased. From this first year's stock the author decided that he would propagate some of the bulbs in the same manner which had been used in propagating the Mead strain. Also, in September of 1951, approximately 150 Ludwig strain seeds were imported and planted. In August of the same year, one Dutch white bulb (unnamed seedling) was cut and the following spring the cuttings and the young seedlings from the imported seed were transplanted into a bed made especially to grow these young Dutch bulbs. September of this year, two years after the cuttings and seeds were planted, the majority of these bulbs have grown to blooming size, that is, $2\frac{3}{4}$" in diameter and above. Some bulbs have reached 4" in diameter. Needless to say, the writer is quite proud of

the fine growth that these bulbs have made. From all appearances, they have grown just as well as any of the Mead strain amaryllis, a few of which were also planted at the same time and in the same beds.

In August of 1952, quite a few of the named Dutch bulbs were cut for propagation, some of these were 'Doris Lillian', 'Albino', 'Red Sparkle', 'Margaret Truman', 'Ludwig's Dazzler', 'Bordeaux', 'Moreno', 'Red Master', and others. During the following spring, (April 1953), these bulblets were transplanted into prepared beds. It was noticed the bulblets from several of these bulbs were more vigorous and seemed to grow much more rapidly than others. 'Red Master', 'Doris Lillian', 'Ludwig's Dazzler', and a purchased seedling which was labeled No. 10 seemed to be growing more rapidly than the others. During the latter part of September of this year (one year after cutting the bulbs), inspection and measurements of the diameter of some of these bulbs showed that approximately 90% of the 'Doris Lillian' bulbs were 2¾" in diameter and up, some of the bulbs going to 3¼ and one 3½" in diameter. The 'Red Master' bulbs were running from 2½ to 3" in diameter and the 'Ludwig's Dazzler' were running from 2¼ to 2½" in diameter. Likewise, bulbs from Seedling No. 10 were running from 2¼ to 2¾" in diameter.

Since the author feels that he has had fairly good success in growing the Dutch amaryllis and since it has been found that they grow equally as well as the Mead strain amaryllis and since some of his friends and presumably others, have had difficulty in growing amaryllis, the writer believes it might be interesting to relate the methods he uses in growing his cuttings, seedlings, and mature bulbs.

In order to receive partial shade for the young bulblets, it was decided to plant them under the edge of some oak trees. However, it was recognized that roots from the trees would offer too much competition for the young bulbs. To keep the shade and eliminate the roots, special beds were constructed.

In preparing the beds for the growing of the bulbs from cuttings the following method was used: A thin concrete slab (tilted for drainage) was poured on top of the ground. This concrete slab was poured approximately one inch thick. Six-inch boards were used to form the sides around the slab. In this prepared receptacle, the amaryllis bed was made in the following manner: Compost from rotted oak leaves and garden sand (sand it is, for our place is an old sand dune) were mixed together. To this bed, which is approximately 12′ long and 7′ wide were added the following: Approximately two pounds of murate of potash, five pounds of super phosphate, four pounds of fish meal, and fifteen pounds of dolomite. These were all thoroughly mixed with the compost and sand giving a depth of approximately five inches. This material was allowed to stand about a month before the bulblets were planted. The soil was again turned, leveled, packed, and the bulblets planted eight inches on center, in rows eight inches apart. Growing this close together one does not have too much trouble in keeping the grass down after the bulbs have started growing. The bulb roots soon form a dense mass which makes it almost impossible to give too much water because

excess water goes through the soil, hits the concrete slab, and either goes on through the concrete or follows the incline down and runs out. Any other excess water is rapidly taken up by the plants and evaporated, provided, of course, one does not have continuous rain for several weeks at a time. To date, using this method, there has been no extensive root rot even though this fall we went through a period of rainy weather which lasted six weeks.

One bed of amaryllis seedlings two years of age had shown extremely poor growth. Upon inspection it was found that the bulbs had not made a good root system. This bed was one that had been prepared several years prior for young camellia seedlings. The soil consisted of pond muck of a heavy black sticky type that held water well. In order to determine, if possible, why some bulbs grew well and others did not, soil samples were taken and analyzed as follows:

Sample Number	Organic Matter	Texture	pH	Lbs./A. CaO	Lbs./A. MgO	Lbs./A. P_2O_5	Lbs./A. K_2O	Nitrates
1	Medium	Fine Sand	6.52	4760+	1990+	515	120	Low
2	Medium	Fine Sand	5.37	3920	1800	595	516	High
3	Medium	Fine Sand	6.56	4760+	1990+	641	480	Very High
4	Medium	Fine Sand	7.10	4760+	1990+	665	156	Med. High
5	Medium	Fine Sand	6.52	4760+	1990+	665	204	Medium
6	Medium	Fine Sand	6.85	4760+	1990+	641	318	Medium

The compounds of calcium, magnesium, phosphorus, potassium, and nitrates were analyzed in pounds per acre. (lbs./A.). To get the parts per million, divide the pounds by two.

Samples No. 1 and No. 2 are from the old camellia bed. These amaryllis (two years old) showed the poorest growth.

Sample No. 3 was from the bed containing cuttings of 'Albino' and Seedling No. 10.

Sample No. 4 was from the bed containing 'Doris Lillian', 'Red Master', and 'Bordeaux'.

Samples No. 5 and No. 6 contained the cuttings of the white seedling and the 150 bulbs grown from the Ludwig seed planted in September of 1951.

The best proportional growth shown by any of the seedlings or cutting bulbs was from the beds represented by Sample No. 4. As mentioned before, after one year of growth, 'Doris Lillian' bulbs ran from 2¾ to 3½" in size. 'Red Master' ran up to 3" and 'Bordeaux' up to 2½". In Bed No. 4 the soil was found to be slightly on the alkaline side, plenty of calcium, magnesium, high in phosporous, medium-high in nitrates, yet one of the lowest (represented) in potassium. Other samples ran high in the above-mentioned minerals, but the bed represented by Sample No. 4 was the only soil containing a pH rating on the alkaline side.

Sample No. 2 was from the bed representing the poorest bulb growth, here is found the pond muck holding much water and the lowest pH rating.

Other seedlings were planted in the ground without any preparation other than a broadcasting of fertilizer composed of fish meal, murate of potash, dolomite, and super phosphate in the same proportion as was

used to prepare the abovementioned beds. This fertilizer was worked into the ground and the young seedlings planted eight inches on center in rows twelve inches apart. These seedlings did not grow as rapidly as those in prepared beds. However, during this year's growth some of the 'Red Master', 'Moreno', and 'Albino' seedlings reached 2½" and a few 2¾" in diameter by September (seed from the 1952 crop).

The reader will notice that no mention has been made of flowers from these cuttings and seedlings. That is due to the fact that this article is being written during the month of December and these bulbs have not had an opportunity to bloom.

All mature bulbs, which were originally purchased, whether potted or grown in the ground have continued to do well, grow, and multiply. When potting the bulbs or planting them in the ground the same fertilizer mixture was used; namely: fish meal, murate of potash, super phosphate, and dolomite. These bulbs were potted in five-quart oil cans which had their tops removed, holes punched in the bottom (using a beer can opener) and then dipped in hot asphalt tar to give the cans a protective coating. This tar coating enables one to use these metal cans for several years. In the writer's opinion, the cans are better than pots for the metal pots do not allow excessive water to evaporate leaving an accumulation of fertilizer salts in the sides of the container as often happens in the case when one uses clay pots. Care should be used to keep the tarred pots from the direct sun during the hot summer months as the black tar may absorb enough heat to burn the amaryllis roots. The writer sets his potted amaryllis under trees where they receive partial shade.

FORCING PRETREATED AMARYLLIS

Hamilton P. Traub, *California*

In December 1953, Mr. Wyndham Hayward sent the writer a pretreated Amaryllis bulb as a 1953-54 Holiday present. This bulb had been produced by a Holland grower, and had been pretreated for early forcing. The directions that accompanied the bulb indicated that it could be brought into flower in from 6 to 8 weeks after potting. On receipt, the tip of the flower scape was barely showing in the neck of the bulb. The bulb was planted in a 6-inch clay pot, using a potting mixture of equal parts of compost and granitic sandy loam, and was brought into flower in our home that is provided with radiant heating in the floor.

(1) The potted plant was placed in a room where the floor temperature ranged from 80° to 85° F., and the air temperature from 72° to 75° F. The bulb was watered liberally from the first day—water was applied every day. Under these conditions, the scape began to elongate at once, and growth was rapid:

Dec. 4—the bulb was potted.
Dec. 18—the peduncle was 19 inches tall; leaves were 3 inches long.
Dec. 25—the first flower began to open.

(2) On December 25, the plant was taken to the living room where the floor temperature ranged from 72° to 75° F., and the air temperature from 70° to 72° F., in order to slow down growth so that the flowers would last longer. The plant was placed in sunlight near the glass wall with southern exposure.

Fig. 13. Pretreated Dutch Hybrid Amaryllis bulb forced into flower in about three weeks. Photo by Frederic Traub.

Dec. 28—the first flower fully open; the second flower almost fully open, and the third just beginning to open; peduncle 30 inches tall; leaves up to 13 inches long. (See Fig. 13).

Dec. 29 to Jan. 4—all of the flowers in prime condition.

Jan. 5—the first flower began to decline.

Jan. 6—the second flower began to decline; peduncle 32.5 inches tall; tuft to 8 leaves up to 21 inches long.

Jan. 8—the third flower began to decline.

It should be indicated that under the conditions it took about 3 weeks from potting time until the first flower began to open. Without bottom heat furnished by the radiant heating in the floor, it is doubtful if the bulb could have been forced into flower in such a short time which was about half of the minimum time (6 weeks) indicated by the Holland grower. It should also be noted that the length of the peduncle, 30 inches at first flowering, is somewhat abnormal, but the flowers were so large that there was a proper balance between the flower size and peduncle thickness and length. The flowers had a color value near Signal Red (819 RHS), and the shape was the Leopoldii (D-5b) type, less imbricated, measuring 3 inches long (side ways), and 7¼ inches across the face. The whole effect, the tall scape, the large, brilliant flowers, and the tuft of 6 leaves made a very grand showing in the living room and was the center of attraction for all the Holiday guests.

Unfortunately, there were no *Amaryllis* x *henryae* (Miniature Division) in flower and the guests could not compare the two extremes and register a preference. In most cases, after the enthusiast has grown the tall types for some years, he expresses a preference for the miniatures. However, there is room for both types. The tall types may be used as decorations placed on the floor because the extreme height makes them unsuitable for table use. The miniatures may be used in arrangements or pot plants on the living room and dining room tables, and also in the window garden.

It should be explained that the flowering time could have been lengthened if the flowers had not been crossed, and if the plant had been placed in a cooler location, 60° to 65° F., each night, and returned to the living room during the day.

It will be interesting to hear in the next Herbertia from members about their experiences in bringing pretreated Amaryllis bulbs into flower for the Holidays.

TROUBLES OF AN AMARYLLIS IMPORTER

Wyndham Hayward, *Florida*

No phase of the bulb business in America entails more worry, sweat and tears than that of the Amaryllis importer. There is no quicker path to ulcers and complete nervous prostration than a few years of dealing in the choice named clones produced by the Holland Amaryllis specialists.

Amaryllis bulbs are a perishable commodity, in fact a truly tropical plant, subject to irreparable and irremediable loss and damage from cold and dampness in transit, en route, on the docks in Holland before departure, at sea aboard some tramp steamer which brings them to New York, or on the docks in New York or Hoboken, N. J., awaiting final customs and plant quarantine examination.

Then once cleared of the customs and plant quarantine hurdles with a clean bill of health, there is the fateful transit from New York to the retail dealer's home town in this country.

Amaryllis, being a spring-flowering bulb, are harvested in the late Fall in Holland, late October or early November. Dried off a few days, the bulbs are packed in individual bags in the case of named clones, to keep them separate and distinct. Packing material may be wood shavings or more recently various grades of vermiculite or a mixture of both. These bags are of strong paper, and usually with ventilation holes for the circulation of air in transit.

Actually this is not an essential if the bulbs are thoroughly dried and "cured" for transport in Holland at the growing end before packing and shipment. All too often, however, the Holland grower or shipper is just too anxious to send the bulbs on their way across the Atlantic, and so the bulbs are not properly dried off before packing. This results in serious sweating and condensation of moisture in the bags during transit, so that on receipt the bulbs are wet and slimy, sometimes the moisture has soaked the bags so that they fall apart when lifted from the case, and the condition may be so bad that named varieties become unavoidably mixed while unpacking the cases.

In case the bulbs are shipped abroad a freight steamer with inadequate provision to keep them warm and dry en route, a serious matter, as in late November and early December there are often storms and blizzards with snow and ice on the broad Atlantic during their passage, the bulbs may be exposed to unfavorable weather conditions on the way, and frequently this may affect part of several cases. Usually the cold damage does not actually kill the bulb, but renders it unfit for immediate retail sales.

In such case the American dealer must make provision to grow the bulbs himself for a season in the effort to restore their lost tissues and size and vitality. Often such bulbs will die in a few weeks after planting. Usually they give only an unsatisfactory bloom, sometimes the bloom capacity is lost entirely for a season or two.

Of course such shipments can be insured, at a high rate, usually about 10 per cent of valuation, against loss in transit. Settlement of claims in such cases has proved, in the writers experience highly and invariably unsatisfactory and involves filing a claim through a Lloyd's Agent, a costly and difficult procedure in current operation of foreign marine insurance in the United States.

For instance, suppose part of an insured shipment of hybrid Amaryllis arrives from Holland, as they often do, with damage to the bulbs from cold and dampness en route. The procedure is to notify the nearest Lloyd's Agent within 30 days of receipt. Actually in such cases, the full extent of damage will not show up in the bulbs until five or six weeks after receipt. The bulbs may seem only superficially damaged on receipt when first unpacked, being only slightly damp and sweaty, sometimes only slightly slimy on the outside layers of the bulb tissue. But a period of three to six weeks will bring a marked change, the bulbs may turn black as they dry, and soft spots may develop at the base, indicating much more serious damage to the bulb tissue than was first apparent.

The Lloyd's Agent appoints an examiner to determine and report the percent of loss. This is at the expense of the importer, the American dealer who received the damaged bulbs. Then after paying the expense of the "survey of loss", the bulb importer pays another fat fee to the Lloyd's Agent for his part in the business. These payments must be made in advance, after having suffered the loss, and are forfeited in case the insurance underwriters in Europe decide against honoring the claim, as can happen, in the writer's experience. In the event that the European adjusters decide to honor the claim or a part of it, the payments advanced to the Lloyd's Agent in the United States are reimbursed, plus the amount of the insurance award.

Collection of the claims is an interminable matter, anywhere from two months to a year or so in the writer's experience. It remains one of the most aggravating aspects of the entire Amaryllis bulb importing trade. A complete investigation of the situation and prompt steps to improve the legal status and protect the rights of the American bulb importer under this system should be undertaken by the proper authorities.

The thought of what he would do some season if the entire shipment of Amaryllis from one of his Dutch exporters were to be frosted in transit by some misfortune, or dumped into New York harbor by some horrible port accident, as could happen and does happen to shipments in transit, is a constant nightmare to the American Amaryllis bulb dealer. The loss of the mere money value of the shipment would be only a part of the disaster, more weighty matters being the return of thousands of dollars to customers, the expenses of importing, duty, insurance, advertising, circulars and catalogues, etc.

The American importer of such bulbs as tulips, hyacinths and Dutch Iris from Holland faces no such crises. These bulbs are usually of low value, $5.00 to $50.00 per 1,000 in most cases, and could readily be replaced if the entire shipment were destroyed or lost. Then too, the freighters crossing the Atlantic in September and October have balmy weather compared to the wintry storms at sea of late November and December.

A point at issue in this matter stands out—why is it not practical to ship matured "cured" Amaryllis bulbs early in November, or late in October? Then they would face much better weather conditions. In Florida, Amaryllis bulbs may be harvested the last week of October and the first week of November as mature as they will ever be during that season. Possibly in the greenhouse growing conditions prevailing in Holland this maturity comes a few weeks later.

After receipt, the Dutch Amaryllis bulbs are immediately unpacked, and if in good, dry condition may be left in their bags until sold or wanted for orders. But the better method usually is to put them in ventilated trays in a warm, dry shed, where temperatures will not go below 35 or 40 degrees F. A minimum of 55 degrees F. would be better. Under our Florida conditions there will be a few nights when the temperature in the bulb storage sheds goes down to 35 or 40 degrees, but if the bulbs are firm and dry they suffer no ill results. Amaryllis, like

caladiums and other bulbs dug at the same time of year, would be injured by freezing temperatures of even brief duration if exposed while still moist and turgid during the drying-off process.

After all these trials and tribulations of ocean and customs house and quarantine examinations, the last leg of the transit to the ultimate receiver, the retail dealer who will sell them, is also fraught with peril to the tender Amaryllis bulb. There is the untrustworthy trucker who takes them from the Plant Quarantine house in New York, who must be contended with. He may be "a bonded trucker" but he has no conscience, and no knowledge of what treatment a rare and perishable Amaryllis bulb must have.

If the trucker has a nearby warehouse in New York, he may take the bulb cases there for storage for a few days to a week before turning them over to the truck lines or express agency for shipment to Florida. The writer has had all of these things happen to his bulbs, so he knows whereof he speaks. Such matters reflect the gravest discredit upon the efficiency and proper operation of the truck lines. Last year (Nov. 1952) the writer had one shipment of Amaryllis valued at $1,400 which was 10 days in transit from the time of delivery to the truckman at the Hoboken plant quarantine house till arrival at Lakemont Gardens in Winter Park. No explanation has ever been offered, either by the customs broker who handled the shipment at New York, or the truck lines bringing it to Florida, and to this day the issue is an unpleasant mystery as a number of choice named varieties in the shipment were found to have suffered from cold and dampness on unpacking. After several months, recovery of around $200.00, about half the potential loss, was obtained from the Dutch and English insurance people, as against an insurance charge of more than $100.00 paid on receipt of the shipment and $42.00 additional in Lloyd's Agent survey expenses and fees.

So stop and think a bit before rushing into the Amaryllis importing business, as no other part of the bulb trade offers more prickly difficulties for the American retail dealer; and have sympathy for the specialist who must charge good prices for his imported Amaryllis bulbs to cover his many overhead costs and unexpected losses.

AMARYLLIS IN FLOWER ARRANGEMENTS

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It cannot be said that the tall amaryllis is one of the most popular flowers for use in arrangements. Despite its real virtues for arrangement work, there are many factors militating against its use, even where it is in relatively abundant supply. Members of the other tribes of the amaryllis family enjoy wider use in decoration in proportion as they differ from the amaryllis in their characteristics of flower form and growth habit. This does not apply to the Miniature Amaryllis which are well suited for arrangements.

Arrangement showing the use of multiple elliptical forms, with McCann Double Amaryllis in the center. See text for full description. Photo by Dr. Philip G. Corliss.
Plate 10

The factors which have prevented wider use of the amaryllis itself in arrangements are:

(1) Except in favored sections of the south or west coast, it is not available to flower arrangers. When it is in bloom, it is not the usual season for flower shows or arrangement displays.

(2) Even where it is grown out of doors, the gardener hesitates to sacrifice the reward of one or more years' work for the briefer pleasure of using the flower in an arrangement.

(3) The large hybrid amaryllis does not fit into the usual kind of arrangement currently popular with American women.

(4) The Japanese, in their many centuries of flower arrangement art, had not used any flowers like the amaryllis; hence they gave us no examples to follow. The Japanese are only now beginning to find ways to incorporate amaryllis, gladiolus, and other African flowers into their stylized arrangements.

The arrangement accompanying this article which exemplifies the use of multiple elliptical forms contains bronze canna leaves to make an oval background (Plate 10). The flower material all belongs to the amaryllis family. In the center is one of McCann's double amaryllis hybrids, surrounded by white crinums and pastel alstroemerias. All of these flowers were cut from my garden in Somerton (near Yuma) Arizona. The Chinese red pottery container with brass base is echoed in the brass candlesticks with Chinese red candles.

The other illustration (Plate 11) is of a shadow box arrangement featuring one stalk of the new Dutch hybrid amaryllis, 'Rose Queen'. In line with the Japanese insistence on using flowers only as they grow in nature, the amaryllis is not accompanied by green foliage but is set in driftwood on which honeysuckle twines upwards. Annual white statice, a garden companion, appears on several places behind the principal flower, to soften but not to clutter the picture.

I have been as guilty as many other Americans in using the most popular member of the amaryllis family—the daffodils—in arrangements which violate the Japanese rule of copying nature. When once understood, this principle makes arrangements which are in accord with it seem much more pleasing than the artificial semi-circles and triangles built by too many of us. Daffodils, when properly grown, like most other members of the amaryllis family, have blooms of the same variety always at almost exactly the same height. This fact should be emphasized when they are used in arrangements, and their stems should not be cut at various lengths so that they can form a crescent or triangle. Nerines and lycoris also bloom at a uniform height for the variety and in some of the color slide sets that I supply to garden clubs I have an interesting pair of arrangements of *Lycoris incarnata* in which I used the same material in a "natural" style arrangement that one of Texas' leading arrangers used in a conventional triangular form. When using amaryllids that bloom without foliage, it is consistent to use driftwood, while such wood is distinctly out of place with flowers that bloom when their foliage is most lush.

A shadow box arrangement (with frame omitted), featuring one scape of the Dutch Hybrid Amaryllis—'Rose Queen'. See text for full description. Photo by Dr. Philip G. Corliss.
Plate 11

Make-up experts have often advised women not to try to hide a feature which is not "average". Large mouths and high foreheads should be accentuated and not hidden. Dark lipstick, heavily applied, makes the large mouth distinctive. The hair pushed back instead of being chopped into bangs at a camouflage attempt is the proper treatment of the high forehead. In the same manner, characteristics of flowers which are considered by some to be a fault, may well be turned into a great advantage. The "stiffness" of the gladiolus spike, for instance, makes it more suitable for creating a strong line in an arrangement. The large size of the flower and stem of the hybrid amaryllis may be similarly turned to advantage by permitting the flower to be used in a simple but bold arrangement.

In conclusion, I feel that the amaryllis offers many attractive rewards to the venturesome flower arranger who takes advantage of its lasting freshness and uses it in a design based on its natural growth habits.

SOME ALLIUMS FROM TEXAS

Lt. Thad M. Howard, *Georgia*

Alliums are good text-book examples for the "poor little rich girls" of the garden world, for they are the recipients of an undeserved social discrimination from the uneducated gardening public. *Allium*, if you have not already guessed, is the botanical name for the common onion, the humble garlic, the succulent leek, the mildly flavored chives, shallots, and the like. But though they have won an established niche in our cooking, they deserve to share an equal lime-light as horticultural beauties in the average garden. True, most of them possess the tell-tale aroma of their edible kin, but they also possess beautifully colored flat or globular heads of flowers on long slender stems. What is even more amazing about these Cinderellas, is the fact that some of them are deliciously fragrant! Sceptics who would not think to smell the flowers of a mere "onion" will scoff at this statement, but the undeniable fact remains that some members of the large group of Alliums—more than 300 species—are pleasantly perfumed. This is particularly true of *Allium tuberosum*, the "Oriental Garlic", and of *Allium fraseri* and its variety *cubae*. Several other Alliums native to our South-western states are also fragrant.

Allium drummondii, a native of Texas, is one of the very finest bulbs for the spring border. This fragrant little Allium is quite wide-spread and variable from place to place. The type that is being offered in cultivation today is a superior form that is worthy of the bulb fancier's attention. Like many of the so-called "minor" spring-flowering bulbs, *A. drummondii* is not tall, being less than a foot in height. The bright, starry flowers are carried in loose, flat heads in clusters of a dozen or more atop stems 8″ or so tall. They may be any shade from pure white to deep rose-purple, with the intermediate shades predominating.

Unlike most other flowers, they darken in color with age, remaining

attached to the stems long after the seeds have ripened. Three or four grayish green slender leaves are produced, and these are about as long as the flower stem. Usually two or three flower stems are produced from each bulb, and these bulbs have a habit of splitting into two blooming size bulbs in early spring before blooming. The bulbs are quite tiny, being ¼-½″ in diameter, with tight reticulated coats.

This "prairie onion" will grow in almost any situation, but prefers an open exposure in well-drained soil. With favorable conditions, *A. drummondii* will make a strong bid for attention in the early spring, for it is a jaunty, cocky little sprite which is capable of making a real color splash when thickly planted. This is particularly true if the planting includes selections of the full color range. The individual flowers are interesting in their variety of patterns and shades, some flowers being solidly colored, while others are white or pink with dark stripes down the center of each petal; still others are red or pink with white centers or "eyes". Even the shape of the flowers varies. So much individual variation within one species is intriguing. This little species has been called by several other names by botanists (synonyms.—*A. helleri*, *A. nuttallii*), but *A. drummondii* is presently the preferred "handle" for this diminutive gem.

Western Texas has yielded another fascinating Allium—a rare-colored yellow species that is very much like *A. drummondii* in general appearance. *Allium Coryi* would be desirable for its color alone, but its tidy habits and dainty sprightliness make it a real aquisition to any collection of rare Alliums. The only known yellow Allium native to the United States, *A. Coryi* is more dependable in gardens of the South-west than the European yellow *Allium Moly*, or even *A. flava*. *Allium Coryi* prefers open exposures in well-drained soils. It varies in color from buff to golden yellow.

Quite unlike the first two species already described, *Allium mobilense* is taller, with globular flower heads, and bright shiny-green, rush-like leaves. It is a less variable species than *A. drummondii*, being restricted to shades of pink and lavender. The densely packed umbels resemble pink puff balls when observed from a distance. This species loves adequate moisture during the growing season, but it must also have good drainage. Well grown specimens of *A. mobilense* may be up to 18″ tall with over a hundred flowers in the umbels. Except for its alliaceous odor, it makes a wonderful cut flower.

A closely related species, *Allium zenobiaea* is very similar to *A. mobilense*, but is more robust and flowers later in the spring. It is often a foot and a half tall, with up to 175 flowers in the umbel. It blooms several weeks after *A. mobilense* has completed its blooming season, and continues for several weeks into the early summer, with pale mauve flowers in place of the pink ones of *A. mobilense*. The robust stateliness of *A. zenobiaea* has caused some botanists to regard it as "the queen of the Texas wild onions". When viewed at its best, it is indeed a majestic "onion". Both *A. mobilense* and *A. zenobiaea* prefer full sun or slight shade, and sandy, well drained soils, with a neutral or slightly acid pH reaction.

All of these Alliums are wonderful for cut flowers for those who do not mind handling the cut stems, which will invariably release their volatile odor. For those who are squeamish in such matters, let them remain uncut in the garden, as they will not "smell" if they are not bruised. The cut ends of the stems will not cause any trouble after they are submerged in water, and the water is changed once. After seeing an arrangement of *Allium mobilense* win first prize at a flower show, the writer is convinced that the lowly onion is certainly capable of traveling in the company of some of the "highly bred" horticultural monstrosities that are termed "beautiful" merely because of their gargantuan and often insipid form. In contrast with other plants, "highly bred" onions are EATEN, while the ornamental forms are unchanged from their native state, only awaiting the gardener who can distinguish natural beauty from the semi-artificiality of the inflated frothy flowers so often seen in today's gardens. There are many Alliums to choose from in many colors, sizes, shapes, or growing seasons. Why not try a few?

[PLANT LIFE LIBRARY, continued from page 17.]

FLOWERS OF THE SOUTH—NATIVE AND EXOTIC, by Wilhelmina F. Greene and Hugo L. Blomquist. Univ. of North Carolina Press, Chapel Hill, N. C. 1953. pp. 208. Illus. $5.00.

This very attractive, profusely illustrated book is the cooperative work of Mrs. Wilhelmina F. Greene, the talented floral artist of Winter Park, Florida, who made the original paintings and drawings, and Dr. Hugo L. Blomquist, botanist at the University of North Carolina, who made most of the descriptions. The book includes a representative selection of some five hundred plants out of nearly six thousand native and introduced exotic plants of the Southeastern United States from Virginia to Texas. There are reproductions of 55 colored illustrations, and some 500 black and white line drawings. The descriptions are concise, and in addition there are helpful notes on cutting, arranging and planting. It is a book that will be appreciated not only in the Southeast but also in all parts of the World where the beautiful is cherished.

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PREFACE

The Giant Arborescent Philodendrons and the Ginger Lilies have been much neglected until recent years, but it now appears that these worthy plants are rapidly gaining in popular favor. This revival of interest in the arborescent Philodendrons is due in great measure to the efforts of two persons—Mr. Mulford B. Foster, of Orlando, Florida, who introduced new material, and Mr. David Barry, of Los Angeles, Calif., who has done much to popularize these plants in California. Mr. and Mrs. Morris Clint, of Brownsville, Texas, have also contributed by introducing a fine new species from Mexico.

The revival of interest in the Ginger Lilies is due almost entirely to the efforts of Mr. Wyndham Hayward, of Winter Park, Florida, where he has brought together the most outstanding collection of these plants in the United States.

In this number of Plant Life, in addition to the articles on the Giant Arborescent Philodendrons and the Ginger Lilies, there is an article on the genus *Nothoscordum*. This includes a description of the genus, a key to the species and the synonomy. This genus includes some very fine garden plants, including species with yellow and lavender colored flowers which are not at present in cultivation. The only species now to be had are *N. bivalve* and *N. inodorum*, both white-flowering. It is hoped that this article will stimulate interest in this group so that the yellow and lavender flowering species will be introduced from South America. The yellow-flowering species are native mainly to Uruguay, and the lavender-flowering species to Chile, Argentina, Bolivia and Peru.

The book reviews (The Plant Life Library) includes excellent new items, particularly, the book entitled, THE SECRET OF THE GREEN THUMB, by H. T. and Rebecca T. Northen, which is easily readable and is on a subject of the scientific facts about plants on which all gardening methods must be based. There are also books, illustrated in color, on wild flowers of the South, and of the United States and Canada. The roster of officers and committees, and the descriptive list of the Society's publications, completes this issue.

1531 Rodeo Road,
Arcadia, California
March 29, 1954

Hamilton P. Traub
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GIANT ARBORESCENT PHILODENDRONS

WYNDHAM HAYWARD, *Florida*

From the windows of his little studio-office in Florida, Mulford B. Foster can look out upon various specimens of a fabulous and fantastic group of plants, the non-vining, self-heading or arborescent species of Philodendrons, the wide dissemination of which in sub-tropical United States is slowly changing the landscaping effects and home grounds and park appearance as never before.

A mere fourteen years ago there were none of these "shrub" type Philodendrons in the Southern United States. A few plants, acquired at great expense from rare plant dealers and botanic gardens in Europe were found on great estates in California, mainly *Philodendron selloum* and *P. speciosum*, which were propagated very slowly by division and stem cuttings of the giant crowns.

In 1939, on his first plant exploration trip to Brazil, Foster, well known bromeliad specialist, hybridizer, landscape artist, of Orlando, Fla., "discovered" huge specimens of *Philodendron bipinnatifidum* growing in the parks of São Paulo and elsewhere in Southern Brazil. He sent back a plant or plants of this species, and another unknown species, which he calls merely "Species No. 1". Cuttings were a failure on the long trip to the United States, but small plants survived and thrived.

On subsequent trips to Brazil Foster found still more species and types of the giant self-heading Philodendrons and brought back living specimens or arranged to have seed sent him. Among the late introductions were *Philodendron undulatum*, from Paraguay, *P. eichleri* from Minas Geraes, Brazil, *P. selloum*, and another unnamed Species, No. 2, from Uruguay, found at the highest altitude of any of the types.

These all belong, botanically, so far as known, to the sub-genus *Mecenostigma* (Schott) Engler, of the genus *Philodendron*. They are mainly characterized by an arborescent type of growth. This may be more or less erect or leaning, and in the case of old plants, the leaning quality may be so exaggerated by the heavy weight of the leafy top so as to bend the stem over till it touches the ground. It will then root and grow upward again, many times with branches in all directions, so as ultimately to enable one plant to cover a circle 20 or 30 feet in diameter. Foster found such plants in São Paulo as he indicated in his article "My Flower Has A Temperature," National Horticultural Magazine, Jan. 1949.

This article remains a landmark in the history of the growing of the arborescent philodendrons in the United States. In it Foster gave a colorful account of his learning about the technique of fertilizing the blossoms of the giant *Philodendron bipinnatifidum* on his nursery grounds at Orlando, how the blooms developed heat during the process of pollination, (pollen emission) a maximum of 102 degrees F. being

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His discovery made Foster the first plantsman in the Western World to solve this seed production puzzle of those great Aroids, which are among the trickiest of all plants in their flower fertilizing requirements, comparing in this to the gingers and orchids. The plants proved to have abundant seed production capacity when the flowers were properly fertilized. The seeds of these giant Philodendrons are small, those of *P. selloum* being slightly smaller than those of radishes. The seed may be sown like vegetable seeds in flats. Seedlings a foot in height with several leaves, having a retail sales value of two or three dollars, can be grown in a single year's time under good culture.

Problems of the time of receptivity of the female flowers at the base of the *Philodendron* spadix and the shedding of pollen from the male flowers above it must be solved for successful seeding of the giant non-vining Philodendrons. For the purposes of this article it is enough to say that the female flowers of one bloom are infertile to the pollen from that flower's anthers, or are past the time of receptivity when the pollen is shed. Pollen must be brought from another flower for fertilizing.

Immediately after publication of Foster's NHM article, Hugh Evans and David Barry, Jr., succeeded in fertilizing blooms of *P. selloum* and produced thousands of seed in California. These have been grown into thousands of small seedling plants of this spectacular species which have now become available in the nursery and rare plant trade for a few dollars for a specimen in a six inch pot.

Meanwhile Foster in Orlando has been busy growing seedlings of *P. bipinnatifidum*, *P. selloum*, and other species and hybrids. His hybrids are believed to be the first *Philodendron* hybrids ever produced in the United States, and possibly the second ever reported in horticultural annals. *P. bipinnatifidum* crossed with "Species No. 1" (unknown) gave him a fine showy hybrid which he called *Philodendron* x *fosterianum*. Another excellent cross produced *Philodendron* x *macneillianum*, which was named after the California Aroid specialist, John MacNeill.

Foster also has seedlings of *P. selloum* x "Species No. 1", and hybrids of *P. eichleri* and *P. undulatum* with other large types growing along at this time. There must be intensive evaluation and study of all the crosses and their possibilities. This is difficult when the parent forms themselves are so new to the horticultural world, at least in the United States.

These giant arborescent types of Philodendrons come from Central and Southern Brazil in the main. According to Foster he has found the wild species over a sub-tropical area a thousand miles long and some 500 miles into the interior, sometimes as near the coast as to be within sight of the ocean itself, growing on rocks, and sometimes along the banks of rivers and streams in the interior. Mostly the wild plants are found in more or less open types of woods, sometimes in higher places where they may suffer light frosts in winter.

This quality of hardiness, and general resistance to cold, in mature, established plants, has endeared them to the hearts of nurserymen and home growers in Florida and California. They can endure several degrees of frost when thoroughly dormant in winter, but of course if in

reached while the outdoor temperature surrounding the plant was 78 degrees F.
active growth tender young leaves might be severely damaged by sub-freezing temperatures.

David Barry, Jr., Los Angeles plantsman, reports that *P. selloum* has stood as low as 22 degrees F. with him on cold nights in Southern California. Foster reports temperatures as low as 25 degrees F., have not injured mature plants of *P. bipinnatifidum* and his "Species No. 1" at his nursery in Orlando. For the first few years he kept his plants inside the greenhouse for protection in winter but after placing them outside as they became too large for the greenhouse, he was pleased to note that they were definitely hardy to the usual sub-tropical winter temperatures of Central Florida where there are several light frosts most seasons.

This means that the new giant Philodendrons should prove satisfactory landscape plants over almost all of Central and South Florida and around the Gulf Coast in regions of similar moderate winter climates. In the sub-tropics in California and Texas they will likewise have their important place. Judging by the changes in recent years since their introduction it is not too much to forecast that this group of plants will prove to be the greatest addition in tropical foliage effects in these states in the coming years of any plant introduction of the present century.

In the North and outside the sub-tropics, these giant types will be valuable additions to conservatories, solariums, and indoor patios, and even in large sun-rooms when not overpotted. When kept in smaller sized pots they do not tend to grow as rapidly as otherwise. When kept in too much shade, however they are not as happy as the vining types of Philodendrons, and the foliage grows outward and flatter.

For many years there has been confusion between plants of *P. bipinnatifidum* and *P. selloum* in the botanical gardens where found. Now since blooming of *P. bipinnatifidum* and *P. selloum* in Florida and California the issue has been straightened out to some degree. The plants are fairly similar and the best that can be said is that *P. bipinnatifidum* has longer, more slender petioles and a more upward airy growth, possibly with more foliage, than the *P. selloum*. Some however, prefer *P. selloum* for its rapid growth and lush, rich, green foliage when well grown. A six inch pot size can be grown to a huge specimen four or five feet tall, in two or three years. Both species are finely cut and waved in the leaf.

P. eichleri is a giant among giants, and a single plant may have a 17-foot spread with its huge wavy-undulate indented leaves. *P. speciosum* is a show piece in itself, with entire leaves like a giant elephant ear, on long petioles. How big this species will get at maturity is still uncertain in the South or California. *P. undulatum* is a smaller type of plant, with entire leaves and more tender to cold than the others although it comes from Paraguay toward the South.

The giant Philodendron situation is still very much in a flux, as new types appear in the seedlings and new hybrids are created annually. One

new and unidentified giant arborescent species growing in the Foster planting has definite thorns a quarter of an inch or more on the rough stem, large enough to scratch the hand. This species was obtained by Foster in Bolivia.

One grower in Apopka, Florida is reported to have 100,000 plants of *Philodendron selloum* coming along from seed at this time, for sale to American florists and foliage plant specialists. No other plant introduction in history has met with such instantaneous and multiplied success. Already it is reported that the growing of these plants may soon outstrip the potential markets in some areas until the general public has been educated to their good qualities.

Fourteen species of these giant arborescent species of *Philodendron* are recognized by K. Krause in his monograph of the Philodendrons in Das Pflanzenreich, Vol. 60, 1913. With the dates of their original publication these are as follows: *P. corcovadense*, Kunth, 1844, province of Rio de Janeiro; *P. tweedianum*, Schott, 1859, Rio Parana; *P. minarum*, Engl. 1878, Minas Geraes; *P. Williamsii*, Hook, 1871, Bahia; *P. speciosum*, Schott, 1832, Minas Geraes, São Paulo and Matto Grosso; *P. brasiliense*, Eng., 1878, Minas Geraes; *P. cymbispathum* Eng., 1899, Minas Geraes; *P. undulatum*, 1879, Eng., Paraguay; *P. saxicolum*, Krause, 1913, Bahia; *P. eichleri*, Eng., 1899, Minas Geraes; *P. adamantinum*, Mart., 1860, Minas Geraes, Paraguay; *P. selloum*, Koch, 1852, Minas Geraes, São Paulo and Paraguay; *P. bipinnatifidum*, Schott, 1832, Rio de Janeiro, Minas Geraes, Santa Catherina and Matto Grosso; *P. lundii*, Warm., 1867, São Paulo. These are all included under the subgenus *Meconostigma* (Schott) Eng. in Krause's monograph, pages 128-136.

Several members of the sub-genus *Euphilodendron*, which are normally epiphytic (found growing on trees) have a low self-heading form and can be grown in pots or tubs similarly to the giant arborescent group. These are smaller plants, with short internodes of the stem and thick fans of leaves, some of them with the fleshy Eichhornia-like petioles characteristic of the species *P. wendlandii* of Costa Rica. They include *P. pinnatifidum*, known to the great Vienna botanist, Jacquin, *P. melinonii*, *P. cannaefolium* and *P. biauriculatum*. All of these can be seen and studied in Foster's collection in Florida.

THE DELIGHTFUL GINGER LILIES

WYNDHAM HAYWARD. *Florida*

The Ginger Lilies, or members of the Ginger Family of Plants, *(Zingiberaceae)* comprise a closely allied group of tropical and subtropical tuberous rooted subjects which are beginning to find a major following among the plantsmen and garden fanciers of the lower South and similar climates. They may also be planted out in summer in the North, and stored in sand indoors during winter. They include some of the most striking foliage and flower plants of the vegetable kingdom.

some of the most beautiful and appealing, some of the most delicately and richly perfumed and some of the most aromatic and poignantly flavored of all growing things.

The world of the sub-tropics, and in fact food and drink all over the world, would be much less enjoyable without the Zingibers. They include such perfumed beauties as *Hedychium coronarium*, the famous "White Ginger" of the Himalayas and Hawaii, *Curcuma longa*, which is turmeric, *Zingiber officinalis*, the ginger of commerce (Canton Ginger), used from time immemorial as a flavoring in Chinese and other Eastern cooking, ginger ale, gingerbread and other Western cookery, and popular as candied, crystallized or preserved ginger as a sweetmeat and in condiments, chutneys, etc.

There are perhaps few staple food plants among the Zingibers, but their place is among that rare and indispensable number of spice plants which make the eating of less palatable foods more enjoyable.

Besides their gustatorial qualities for the gourmet and gourmand, the Gingers include numerous spectacular flowers so sensational that they are among the most favored of sub-tropical subjects. Among these would be mentioned Alpinias, Costus and Hedychiums, certain Curcumas, the fabulous *Phacomeria magnifica* and *Alpinia purpurata* of Hawaii gardens, while against these giants of the flower garden, so to speak, we may place the dainty and charming Kaempferias, whose delightful flowers and perfumes are borne so lowly we must stoop down close to them to appreciate them fully.

These genera of the *Zingiberaceae* are the best known of the family in cultivation. Altogether the Zingibers include some 45 genera with 1,300 species, which makes them comparable as a family to the Palms, the *Bromeliaceae*, the *Gesneriaceae* and others. Of the amazing list of other genera and the hundreds of species in this family, only a small proportion, a minimum of a few dozen species are in cultivation, and still less in America or Hawaii.

They have long been favorites in the tropics and sub-tropics, and conversation plants in greenhouses since the days of Jaquin at Castle Schoenburn in Vienna, when some of the first were grown under glass and described.

One or two of the rare genera, as *Renealmia*, *Dimerocostus*, *Roscoea*, *Globba*, *Amomum*, *Cautleya*, etc., are occasionally met in choice collections.

There is a great need for the introduction of new and rare species of all the genera mentioned in this article, and many more. Some of the Hedychiums, Kaempferias, Roscoeas and Cautleyas are half-hardy and can stand the winters in mild climates where the ground does not freeze too hard, as in the South of England and around the Gulf Coast in the South. There is an excellent discussion of these half-hardy species in Col. C. H. Grey's "Hardy Bulbs", Vol. II, 1938, now unfortunately out of print, and difficult to obtain outside of libraries. He lists them under *Scitamineae*, as the family is sometimes known.

The standard monograph of the *Zingiberaceae* is by K. Schumann, in Heft 20, Das Pflanzenreich, published by A. Engler, 1903. This is a

sturdy volume of 458 pages, which will give the unsuspecting beginner some idea of the work to do in this great family before we can become even faintly satisfied with our knowledge of its rare beauties. Schumann lists 38 Hedychiums, 55 Kaempferias, 87 Amomums and 40 Aframomums, virtually all of which are part of a vast blind spot in our garden vision at the present time. He also allows 94 species of Costus, 136 of Alpinia, 16 Phaeomerias, etc. There are numerous other genera which seem simply fascinating from the botanical illustrations, but about which we know nothing from practical experience.

The Alpinias known to be in cultivation in the United States and Hawaii are only three or four, *A. speciosa* (A. nutans), *A. formosana*, *A. mutica*, *A. purpurata*, and *A. sanderae*. Of these the commonest is the almost hardy *Alpinia speciosa*, the showy Shell Lily of Florida and California, and known in Hawaii as the Pink Porcelain Lily. It has a typical ginger family foliage, long ovate leaves on a sheathing stem which may be five or six feet tall on high land, or 10 to 15 or even more feet tall on rich moist bottom or lake-bank soil. This plant is ornamental as a hedge or barrier, as a specimen clump and for large flower arrangements. The flowers are in huge terminal racemes trailing from the ends of the leaf stems, like glowing ceramic cockle-shells. The sheathing corollae are white, and the inner parts of the flower labellum and stamen, orange-red and yellow. *A. sanderae* is a rare variegated foliage form of uncertain botanical standing.

A. formosana is a more slender plant, making a good border subject with smaller and less showy erect inflorescences. It will grow 2-3 feet tall on high land, and twice that on rich soil. *A. mutica* is a smaller version of *A. speciosa* with erect raceme and similar but more modest flowers. *A. purpurata* is a showy ultra-tropical species from the far Pacific and Malaysia, popular in Hawaii but hard hit by the slightest frost, and for this reason not well established anywhere in Florida to this writer's knowledge. Slight frost has killed plants of it in pots and in the ground in protected places at Winter Park, Fla., several times. In Hawaii it grows several feet tall.

Similarly, only a small number of *Costus* species are in cultivation in the United States and Hawaii, including *C. speciosus*, *C. spicatus*, *C. igneus* (?), *C. sanguineus*, and a few more. The two best known are *Costus spicatus* from the West Indies, closely allied to *C. cylindricus*, having a large green cone of bracts with orange and yellow flowers, and the famous "Crape Ginger" of Hawaii, *C. speciosus*, with compact red terminal cones and large petunia-like white flowers with a yellowish throat. This species grows six to eight feet tall and is unusual and showy. It is tender to the slightest frost and may be cut to the ground in Central Florida during cold winters, but has been established in both high and low ground at Lakemont Gardens and elsewhere in the state. It comes up again from the roots when cut back by cold.

This is believed to be the plant listed in part as *Costus arabicus* by Linnaeus in Species Plantarum first edition of 1753, which was confused in the description with another plant. It was later described as *Banksia speciosa* by Koenig in 1783. Other species of *Costus* are rare novelties

in Southern gardens at this time. All *Costus* species are popularly known as Spiral Flags from the way the leaves rotate around the stem.

As for the Hedychiums, so dearly beloved by the Hawaiian people as Lei flowers, the name, *Hedychium*, is from the Greek, meaning "sweet snow", with reference to the initial species described, *H. coronarium*, the White Ginger. Besides *H. coronarium*, only the following are grown in the United States in any quantity,—*H. flavum*, a yellow species similar to *H. coronarium*, but of slightly taller stature; *Hedychium chrysoleucum*, also like *H. coronarium* but with yellow blotches on the white lip of the flowers, and the extravagantly lovely gold on yellow, *H. gardnerianum*, which deserves to be much better known in the lower South. *H. coronarium* is grown by the thousands in Florida where it is better known as Butterfly Lily.

The writer has small clumps established of several thyrse-type flowered species obtained from upper India including *H. thyrsiflora* and *H. aurantiacum*. The Himalaya region is rich in Hedychiums which extend up to 9,000-foot altitude in some cases. In the Lakemont Gardens collection are *H. thyrsiflora*, *H. aurantiacum*, *H. greeni*, a new red species, not listed in Schumann. Hybrids are also reported from India nurseries.

Phaeomeria magnifica is the storied Red and Pink "Torch Ginger" of Hawaii, where it has taken a strong hold on the imagination and affections of the people of all races. It is one of the most remarkable of the ginger flowers at its best, a rounded head of red or pink bracts atop a stem of several feet, rising from the ground separately from the tall leafy stem. Blooms of this are shipped to the mainland by the Hawaiian flower growers. It is very tender to frost and not well established anywhere in Florida.

Zingiber officinale, the Jamaica or Canton ginger of commerce is not a highly decorative plant, but is grown by thousands of acres in India, China, and the West Indies for the trade. The uncooked fresh rhizomes bring 50c per pound or more in the New York markets where it is a vital part of the Chinese flavoring category. The leaves are borne on stems upright, two or three feet high at most and the inflorescence is a small green clone atop a short stem, having inconspicuous flowers with a dark purple labellum.

Zingiber zerumbet is a handsome weed in tropical plantations when it grows out of place, but is a treasured ornamental in Florida where it is known as the Red Pine Cone ginger because the cone of bracts after flowering time gradually turns a beautiful, deep, crimson red. The small flowers themselves are creamy white with yellowish center when appearing out of the bracts, one or two at a time. The leaves are less stiff and more graceful and larger than those of *Z. officinale*. There is a highly decorative variegated (white and green foliage) form of this species known as *Zingiber darceyi*, that is much in demand by garden lovers north and south.

Only the Curcumas and Kaempferias remain for consideration, of the Zingibers cultivated in the United States and Hawaii. Several species of *Curcuma*, headed by *C. zedoaria*, an Indian type, are grown

for the tropical effect of their foliage and the brilliant spikes of rosy-p and rose-purple bracts in spring. One of the largest of these spri blooming species is believed to be *C. latifolia*, growing six to eight f tall, and having showy cones like rose-purple pinwheels on strong inch stems. It and *C. zedoaria* have showy chocolate-red stripes do the mid-rib of the upper scales of their leaves.

Two other species are also popular where known—*C. petiolata*, fro India, found all over the lower South from Brownsville, Texas Savannah, Georgia, and known there as Orchid Ginger and Hidden Lil It is half hardy like *Hedychium coronarium*, and bears its lavender-pin cones of bracts in late summer in the center of the attractive plaite leaves. The leaves and spikes of bloom are widely used for arrange ments and bouquets. The rare Burmese species *C. roscoeana*, wit bright orange or terracotta colored bracts in similar spikes in late summer has been introduced by Lakemont Gardens and is becoming well distributed and much admired.

Curcumas produce drug and spice products known as zedoary and turmeric. Many of them have brilliant yellow and orange colored rhizomes with various aromatic qualities. They are a popular condiment plant in the East, and the roots of some species are used in curry powders, according to the best information.

The Kaempferias are the smallest members of the Ginger family grown in the United States and while mentioned last are by no means the least charming and delightful. They are usually grown as pot plants or border plants in shady places in the lower South, or under glass farther North. They may be dried off in winter and the roots stored in the dirt in the pots or boxes in which they were grown.

Two well known species occasionally found in deep South gardens are *K. rotunda*, a Linnaean plant which has several names, as Resurrection Plant, Tropical Crocus, etc, since it remains dormant all winter and sprouts up its flowers at ground level with surprising effectiveness in spring in warm climates. One must get down on the hands and knees to smell their lovely violetish scent when grown in the ground so it is better to grow them in pots. The bulbs or tubers will bloom repeatedly from the dry tuberous roots, like Colchicums, and they may have a prosperous trade future as a result of this. A tuber can be shipped thousands of miles, potted up and will go to blooming in a few weeks. The flowers last only a day each but are repeated every other day or so for a month in some cases. Ten to 15 blooms from a strong tuber is not uncommon.

The flowers of *K. rotunda* are white with lavender lips. The foliage, which appears after blooming is one to two feet tall, like a Maranta, prettily patterned in silvery green above, and shaded deep purple on the under side. Few plants provide more in the way of novelty and beauty for their size. Tubers can be dried off in November and replanted in March or April.

K. galang is an old plant, mentioned by Linnaeus in the Hortus Cliffortianus in 1737, in Holland, and is used as a vegetable in the diet of millions in the Far East. Dr. J. J. Occhse lists it in his "Vegetables of

the Dutch East Indies. It has charming round fleshy light green leaves, with miniature orchid-like, fleeting blooms in summer, white with purple blotches on the lips. The plants are low growing and only a few inches tall, with flowers close to the ground. The blooms repeat many days.

Another *Kaempferia* fairly well known in Florida is *K. gilbertii*, having attractive white-bordered upright leaves of dark green, and scanty purple flowers. It is an ornamental plant with variegated foliage and is a valuable pot plant as are all Kaempferias. Other lovely Kaempferias now grown in the United States are *K. involucrata*, sometimes seen under the name *K. parrishii*, which has daintily plaited light green leaves, and pink-lavender flowers in involucres atop four to six inch stems, altogether charming, and a fine pot plant. Finally there is the showy *Kaempferia atro-virens*, or at least a remarkable plant received from India under that name, but having more the appearance of *K. Roscoeana*, as illustrated in Curtis' Botanical Magazine, with two or three broad, spreading exotically patterned dark green leaves, iridescent like the "eyes" of a peacock's tail, and with inch-wide lavender-pink flowers. The blooms appear intermittently all summer. It is one of the most continuously floriferous plants known to modern ornamental horticulture and never fails to attract attention by its flowers and foliage in a collection. The tubers can be dried off in winter and stored till spring. It goes dormant naturally like the other Kaempferias in late fall. A large plant is only 8 to 10 inches across and a few inches high. It wants part to full shade, but plenty of light for best development. As the "Peacock Plant" it is becoming well known and popular in the American bulb and pot plant trade, and may sweep to new heights of popularity in the future. The root-stock consists of roundish pieces of rhizome which may be separated with fleshy roots attached for multiplying stock in the spring. It also makes seeds in the involucres while growing and blooming in the summer and the seed fall to the ground and sprout in the pots or flats where they lie. The plant answers the description of *K. roscoeana* except that the flowers of that species are specified as white, and those of this new import are distinctly lavender-rose.

NEW CODE FOR NAMING CULTIVATED PLANTS

At the 13th International Horticultural Congress, London, Sept. 1952, steps were taken toward the adoption of an International Code of Nomenclature for Cultivated Plants. The Congress formally adopted a resolution expressing its approval of the main points in a draft prepared by an International Committee, and charging the Committee with the preparation of the full text, embodying these points, for wide circulation and trial prior to submission to the next Horticultural Congress. The full text of the revised Code, prepared under the Secretaryship of Mr. William T. Stearn, was circulated early in October 1952 to all members of the Joint Committee. Their suggestions were correlated by a sub-committee, and the final version based on these decisions was published in July 1953. It is hoped that before the next Horticultural

Congress meets, the Code adopted by the horticulturists, may be approved also by the agronomists and foresters so that the endorsement of this worthy project may be made unanimous.

Mr. Stearn, the Secretary, and the other Committee members are to be congratulated on a most excellent job. All of those interested are urged to obtain a copy of the new Code. It may be had at the low price of 25 cents by writing to: Dr. G. H. M. Lawrence, Secretary, American Horticultural Council, Bailey Hortorium, Ithaca, N. Y.

The Code has been adopted as the guide in editing PLANT LIFE, including HERBERTIA, and other Society publications. In the past, fancy names for clones were printed in "capitals and small capitals", but now this has been made un-necessary by placing the names between single quotation marks. Thus the fancy name DORIS LILLIAN is now rendered as 'Doris Lillian'. This is only one case but an important indication of the usefulness of the Code since it will save much editorial time. All contributors are urged to use the single quotation marks hereafter for fancy names.—*Editor.*

THE GENUS **NOTHOSCORDUM**: DIAGNOSIS, KEY TO SPECIES, AND SYNONYMY

HAMILTON P. TRAUB, *California*

The genus *Nothoscordum* Kunth (1843) was much neglected until Beauverd (1908) described a number of new species from Uruguay and in the same paper gave a brief summary of the genus as a whole. As interpreted by Beauverd (1908), the genus included also the species that are now assigned to the genus *Ipheion* Rafin. Linnaeus described the species *Ornithogalum bivalve* L. (1753) which was later placed in the genus *Nothoscordum* by Britton (1896). When the genus *Nothoscordum* Kunth was mistakenly "conserved", the type was indicated as *N. striatum* (Jacq.) Kunth, but this is a synonym of *Nothoscordum bivalve* (L.) Britton. (1896).

Morton (Taxon 3: 21-23. 1954) has shown that the "conservation" of *Nothoscordum* Kunth was un-necessary to say the least. Of the names listed as *nomina rejicienda,—Geboscon* Rafin., *Peribola* Rafin., and *Pseudoscordum* Herb., none is eligible to replace *Nothoscordum* according to the International Code (1953). *Geboscon* Rafin., (1824) is a *nomen nudum*, and is not validly published in 1824; subgenus *Geboscon* Rafin. (1833) is a subgenus of *Allium L.*, and has no effect on the nomenclature of the genus *Nothoscordum* Kunth; *Geboscon* Rafin. 1836 (1837) is a synonym of *Allium* L.; *Peribola* Rafin. (1936) belongs to the *Nolanaceae* and has no connection with *Nothoscordum;* and *Pseudoscordum* Herb. (1837) is a *nomen prov.* et *nomen subnudum.*

Since descriptions in English are now available for all *Nothoscordum* species, the urgent needs of Plant Life readers are a diagnosis of the genus, a key to the species, and their synonymy.

Genus **NOTHOSCORDUM** Kunth

Enum. Pl. *4:* 457. 1843; Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 993. 1908, in part (excluding sect. *Uniflorum* Beauv.). Syn.—Subgenus *Geboscon* Rafin., Atl. Jour. extra number of no. 6: page 65. 1833: *Pseudoscordum* Herb., Amaryll. 11. 1837, *nom. prov. et nom. subnudum; Caloscordum* Herb., in Bot. Reg. Lond. *30:* Misc. 67. 1844; *Sowerbaea* Spreng. ex Baker, in Jour. Linn. Soc. *11:* 381. 1871, in synon.; *Hesperocles* Salisb., in Gen. Pl. Fragm. 85. 1866; *Oligosma* Salisb., l. c. 86.

DIAGNOSIS.—Bulbous perennials without an alliaceous smell; bulb spherical, globose, ovate or ovoid, with or without a neck; *leaves* filiform, sub-filiform, linear-filiform, narrowly-linear, linear, or linear-oblong, usually present at flowering time, 1—10 mm. wide; *peduncle* 1—25 cm. tall, rarely entirely hidden in the neck of the bulb, slender; *spathe* usually 2-valved, rarely 1-valved, lanceolate, oblong-lanceolate, ovate-lanceolate, ovate-acuminate or ovate; *umbel* 2-many-flowered; pedicels filiform or slender, usually unequal in length; *ovary* trilocular, 4-12 ovules per locule; *tepaltube* ranging from the bare union of the tepalsegs

at the base to the well-developed tepaltube which is usually cup-shaped; *tepalsegs* six, elliptic-lanceolate, elliptic-oblong, lanceolate, oblong-lanceolate, oblanceopate-spatulate, lanceolate-spatulate, oblong-obtuse or oval; pure white; white or whitish uninerved with dark violet, purplish, purple, or yellowish; white with yellow at base; yellow; yellow with green at base; sulfur uninerved with green; yellowish uninerved with gold; and pale lilac; *stamens* six inserted at base of tepaltube when it is very short, or inserted on the tepaltube or at its throat when it is well-developed; *filaments* linear-oblong and oblong to subulate; *anthers* linear-oblong to oblong; *style* short or rarely elongated, filiform; *stigma* deeply tricuspidate, depressed-rotund, subcapitate, conic or capitate.

TYPE SPECIES: *Nothoscordum striatum* Kunth, Enum. Pd. *4:* 459. 1843. = *Nothoscordum bivalve* (L.) Britton, in Illus. Fl. North USA. *1:* 415. 1896.

SYSTEMATIC POSITION: *Amaryllidaceae,* Tribe *Allieae,* Hutchinson (1934), near *Allium, Tristagma, Ipheion,* and *Muilla.*

DISTRIBUTION: Main area:—Argentina and Chile northward to the United States. Minor area:—Siberia, Japan and China. One species, *N. inodorum,* is widely naturalized as an escape from cultivation, and it has been cosmopolitan in distribution for many years.

KEY TO THE SPECIES OF NOTHOSCORDUM

1a. Plants inadequately described:
  2a. Flowers white with purple vein, umbel 3-4-fld., leaves narrowly linear (Chile) ..... 1. *brevispathum*
  2b. Flowers white, yellowish at base, violet mid rib, umbel 2-5-fld., leaves narrowly linear (Chile) ..... 2. Vernum
  2c. Flowers rose-colored, umbel about 10-fld., leaves 10 mm. wide (Chile) ..... 3. *nidulum*

1b. Plants adequately described:
  3a. Spathe 1-valved (subgenus *Caloscordum*):
    4a. Scape 10-25 cm. tall; tepalsegs linear-oblanceolate, united for 1/3 of its length (Siberia, Japan & China) ..... 4. *nerinflorum*
    4b. Scape shorter, tepalsegs blunt, reflexed (China) ..... 5. *tubiflorum*
  3b. Spathe 2-valved (subgenus *Eunothoscordum*):
    5a. Peduncle very short, almost lacking (1—10 mm. long):
      6a. Leaves 2-3 mm. wide (Argent.) ..... 6. *sessile*
      6b. Leaves 4-10 mm. wide (Peru) ..... 7. *fictile*
    5b. Peduncle relatively long (4-30 cm.):
      7a. Stamens as long or longer than half of tepalseg length; flowers white, tepalsegs short (about 5 mm.) (Paraguay) ..... 8. *macrantherum*
      7b. Stamens much shorter than half the length of the tepalsegs; flowers white or yellow:
        8a. Leaf sheaths included in the bulb or emerging slightly from the neck:
          9a. Bulb up to 1 cm. in diam.; umbel 1-2, rarely 3-4-fld.; tepalsegs about 1 cm. long, yellow (or white, veined brown according to Kuntze) (Uruguay) ..... 9. *bonariense*
          9b. Bulb 2-3 cm. in diam.; tepalsegs white, 10-13 mm. long, 2-5-3 mm. wide:
            10a. Bulb about 2 cm. in diam.; umbel 3-6-fld.; flowers white, veined violet; style surpassing the stamens; leaves much shorter than the scape (Uruguay) ..... 10. *gaudichaudianum*
            10b. Bulb at least 3 cm. in diam.; umbel 2-3-fld.; tepalsegs (White?) veined green; style exceeding the stamens; leaves as long as or longer than the scape (Uruguay) ..... 11. *grossibulbum*

8b. Leaf-sheaths decidedly exserted, enveloping and forming a long neck on top of bulb:
11a. Plant without leaves at flowering time; tepalsegs 6 mm. long, white, greenish-nerved (Uruguay) ..... 12. *nudum*
11b. Plant developing leaves before flowering:
12a. Bulb very small, spherical, less than 1 cm. in diam.; tepalsegs entirely white; leaves very short at flowering time; base of scape scabrid (Uruguay) ..... 13. *scabridulum*
12b. Bulb more than 1 cm. in diam.; base of scape smooth; flowers yellow, white or light lilac:
13a. Flowers yellow:
14a. Bulb up to 1.5 cm. in diam.; scape rigid, up to 15-30 cm. tall; umbel few-fld.; 6-8 ovules per locule; leaf-sheaths attenuated into a rigid limb, edges inrolled (Uruguay) ..... 14. *minarum*
14b. Bulb about 1 cm. in diam., rarely less; scape 6-13 cm. tall, strongly sheathed at the base; umbel many-fld.; 5 ovules per locule; leaf-sheaths widened at the apex, truncated and abruptly contracted into the very glabrous leaf (Argent. to Mex.) ..... 15. *gramineum*
13b. Flowers white or light lilac:
15a. Bulb longly obconic:
Scape 5-15 cm. tall; leaves 2-4 mm. wide; flowers light lilac (Chile, Argent. Bolivia & Peru) ..... 16. *andicola*
15b. Bulb subglobose:
16a. Flowers not fragrant:
17a. Scape 6-20 cm. tall; leaves 3-5 mm. wide; tepalsegs white, brown or green nerved (S. and N. Amer.) ..... 17. *bivalve*
17b. Scape 10-18 cm. tall, very rigid; leaves 3-4 mm. wide; tepalsegs whitish, only very slightly united at the base (Uruguay) ..... 18. *sellowianum*
16b. Flowers fragrant:
Scape somewhat rigid, 20-40 cm. tall; tepaltube about 1/3 as long as the tepalsegs; 8-12 ovules per locule; leaves up to 10 mm. wide (Cosmopolitan) ..... 19. *inodorum*

SPECIES NAMES AND SYNONYMY

1. NOTHOSCORDUM BREVISPATHUM R. A. Phil., Anal. Univ. Chile 93: 268. 1896; Plant Life *9:* 153. 1953.

2. NOTHOSCORDUM VERNUM R. A. Phil., Anal. Univ. Chile *93:* 267. 1896; Plant Life *9:* 153. 1953.

3. NOTHOSCORDUM NIDULANS R. A. Phil., Anal. Univ. Chile *93:* 268. 1896; Plant Life *9:* 153. 1953.

4. NOTHOSCORDUM NERINIFLORUM (Herb.) Benth. & Hook. f. Gen. *3:* 802. 1880. Syn.—*Caloscordum neriniflorum* Herbert, in Bot. Reg. Lond. *30:* Misc. 67. 1844; Lindley, Bot. Reg. Lond. *33:* pl. 5. 1847, err. *nerinifolium*; *Allium neriniflorum* (Herb.) Baker, in Jour. Bot. Lond. *3:* 290. 1874; Vvedensky, in Herbertia *11:* 216-217. 1944; *Allium thunbergii* Regel, in A. H. P. *3:* 234. 1875, non G. Don.

5. NOTHOSCORDUM TUBIFLORUM (Rendle) Stearn, in Kew Bull. Misc. Inf. page 107. 1931. Syn.—*Allium tubiflorum* Rendle, Jour. Bot. Lond. *xliv:* 44, pl. 476 C. 1906.

6. NOTHOSCORDUM SESSILE (R. E. Fries) Beauverd, in Bull. Herb. Boiss. ser. 2, *8:* 1005. 1908; Plant Life *8:* 147. 1952. Syn.—*Allium sessile* R. E. Fries, in Act. Soc. Sci. Upsal. ser. IV. *1:* 165. 1905.

7. NOTHOSCORDUM FICTILE Macbride, in Field Mus. Nat. Hist. Bot. Ser. *11:* 12. 1931; Plant Life *8:* 149. 1952.

8. NOTHOSCORDUM MACRANTHERUM (Kuntze) Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 1005. 1908. Syn.—*Allium macrantherum* O. Kuntze, in Rev. Gen. *3:* 312-313. 1898.

9. NOTHOSCORDUM BONARIENSE (Persoon) Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 1001—1002, fig. 4-G-H. 1908; Plant Life *9:* 79. 1953. Syn.—*Ornithogalum bonariense* Persoon, in Syn *1:* 363. 1805; *Northoscordum poiretii* Kunth, Enum. Pl. *4:* 464. 1843; *Allium bonariense* Grisch., in Symb. ad fl. Agr. 319. 1879; *Northoscordum montevidense* (*montevidensis* sphalm) Beauverd, in Bull. Herb. Boiss. ser. 2. *6:* 1011. 1906.

10. NOTHOSCORDUM GAUDICHAUDIANUM Kunth, Enum. Pl. *4:* 458. 1843; Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 1004, fig. 5-E-G. 1908; Plant Life *9:* 80. 1953.

11. NOTHOSCORDUM GROSSIBULBUM Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 1003, fig. 5-A-D. 1908; Plant Life *9:* 166. 1953.

12. NOTHOSCORDUM NUDUM Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 998-999, fig. 3-A-C. 1908; Plant Life *9:* 165. 1953.

13. NOTHOSCORDUM SCABRIDULUM Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 1000—1006, fig. 3-D-G. 1908; Plant Life *9:* 165. 1953.

14. NOTHOSCORDUM MINARUM Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 1001, fig. 3-H-M. 1908; Plant Life *9:* 165-166. 1953.

15. NOTHOSCORDUM GRAMINEUM (Sims) Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 995, 1004, fig. 4-G-H. 1908. Syn.—*Ornithogalum graminéum* Sims, in Bot. Mag. Lond. *50:* pl. 2419. 1823; *Triteleia aurea* Lindl., in Bot. Reg. Lond. *27:* 78. 1841; *Nothoscordum flavescens* Kunth, Enum. Pl. *4:* 459. 1843; Baker, Saund. Ref. Bot. *5:* Pl. 351. 1873; *Allium flavescens* Poepp. ex Kunth, Enum. Pl. *4:* 459. 1943; *Nothoscordum striatellum* Kunth, Enum. Pl. *4:* 458. 1843; *Nothoscordum philippianum* Koch et Bouche, in Ind. Sem. hort. berol. 1853; *Allium striatellum* Lindl., in Trans. Hort. Soc. Lond. *6:* 97. 1855; *Milla aurea* Baker, in Jour. Linn. Soc. *11:* 386. 1871; *Nothoscordum aureum* (Lindl.) Johnston & Parodi, in Rev. Facult. Agron. Vet. Buenos Aires *7:* 182. 1930, non N. aureum (Kellogg) Hook. f. 1871; *Bordiaea aurea* Macloskie, in Rep. Princeton Univ. Exped. Patag. *81:* 304. 1903-06.

16. NOTHOSCORDUM ANDICOLUM Kunth, Enum. Pl. *4:* 463. 1843; Plant Life *9:* 79-80. 1953. Syn.—*Milla audicola* Baker, in Jour. Linn. Soc. *11:* 381. 1871.

17. NOTHOSCORDUM BIVALVE (L.) Britton, in Illus. Fl. North. USA. *1:* 415. 1896. syn.—*Ornithogalum bivalve* L., Sp. Pl. ed. 1. 306. 1753; *Allium ornithogaloides* Walt., Fl. Carol. 121; Bosc., in Poir. Encyc. suppl. 1. 265; *Allium subbiflorum* Colla, in Pl. Rar. Chil. *4:* 13-14, pl. LII. 1836; *Nothoscordum striatum* Kunth, Enum. Pl. *4:* 459. 1843; *Nothoscordum strictum* C. Gay, Fl. Chil. *6:* 114. 1853; *Nothoscordum pulchellum* Kunth, Enum. Pl. *4:* 458. 1843; *Nothoscordum ornithogaloides* Kunth, Enum. Pl. *4:* 460. 1843; *Triteleia berteri* Kunth, Enum. Pl. *4:* 467. 1843; *Oligosma bivalvis* Salish., in Gen. Pl. Fragm. 86. 1866; *Milla subbiflora* Baker, in Jour. Linn. Soc. *11:* 385. 1871; *Brodiaea subbiflora* Baker, in Gard. Chron. ser. 3. *20:* 459. 1896; *Brodiaea berteri*

(Kunth) Fuentes, in Bol. Mus. Nac. Chile *12:* 110. 1929; *Nothoscordum texanum* M. E. Jones, Contrib. W. Bot. No. 17. 21(1930).

18. NOTHOSCORDUM SELLOWIANUM Kunth, Enum. Pl. *4:* 460. 1843; Plant Life *9:* 78. 1953.

19. NOTHOSCORDUM INODORUM (Ait.) Nichols, in Dict. Gard. *2:* 447. Syn.—*Allium inodorum* Aiton, in Hort. Kew *1:* 427. 1789; *Allium fragrans* Ventenat, in Hort. Cels. pl. 26. 1800; *Allium euosmum* Link et Otto. Ic. Pl. Rar. Hort. Berol. *1:* 15, pl. 8. 1820; *Allium sulvia* Buch.-Ham., in Don, Prod. Fl. Nep. 53; Mem. Werner Soc. *6:* 99. 1826; *Peribola paradoxa* Raf., in Fl. Tellur. *4:* 84. 1836; *Nothoscordum fragrans* Kunth, Enum. Pl. *4:* 461. 1843; *Nothoscordum euosmum* Kunth, Enum. Pl. *4:* 460. 1843; *Nothoscordum sulvia* Kunth, Enum. Pl. *4:* 462. 1843; *Nothoscordum borbonicum* Kunth, Enum. Pl. *4:* 462. 1843; *Nothoscordum macrostemon*, Enum. Pl. *4:* 463. *Hesperocles fragrans* Salisb., in Gen. Pl. 85. 1866; 1843; *Milla macrostemon* Baker, in Jour. Linn. Soc. *11:* 381. 1871; *Sowerbaea americana* Spreng. ex Baker, Jour. Linn. Soc. *11:* 381. 1871, in synon.

DOUBTFUL AND EXCLUDED SPECIES

Nothoscordum siculum Hort.—cf. Gard. Chron. ii(1884)174 = *Nectaroscordum siculum* (Lindl.) Gren. et Godr.

Nothoscordum canescens Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 998. 1909 = *Ipheion hirtellum* (Kunth) Traub.

Nothoscordum lloydiflorum Beauverd, l. c. 998. = *Ipheion lloydiflorum* (Beauverd) Traub.

Nothoscordum marici Leveille, in Fedde, Repert Nov. sp. *7:* 384. 1909. China.

Nothoscordum ostensii Beauverd, in Bull. Herb. Boiss. ser. 2. *8:* 996. 1909. = *Ipheion sellowianum* (Kunth) Traub.

Nothoscordum subscssile Beauverd, l. c. 997 = *Ipheion subsessile* (Beauverd) Traub.

Nothoscordum felipponei Beauverd, in Bull. Soc. Bot. Geneve. ser. 2. *13:* 267. 1921 = *Ipheion felipponei* (Beauverd) Traub.

Nothoscordum poeppigii Fuentes, in Rev. Chil. Hist. Nat. *25:* 237. 1923: *Allium poeppigii* Kunth, Enum. Pl. *4:* 456. 1843.

Nothoscordum hirtellum (Kunth) Herter, in Ind. Sem. Montev. (1928-29) = *Ipheion hirtellum* (Kunth) Traub.

Nothoscordum andinum Kunth ex Fuentes, in Rev. Chil. Hist. Nat. *25:* 238, in obs. : *Ornithogalum andinum* Kunth.

PLANT LIFE LIBRARY

THE SECRET OF THE GREEN THUMB, by Henry T. Northen and Rebecca T. Northen. Ronald Press Co., 15 East 26th St., New York 10, N. Y. Pp. 431. Illus. 1954. $5.00.

At last we have a concise, readable book by acknowledged authorities written to "give gardeners the scientific facts about plants on which all gardening methods must be based." The book is comprehensive; the topics discussed in the 21 chapters include the life story of plants; roots, stems and leaves; water relations of plants; plants at work; food for growth; light; temperature; soils and nutrition; plant hormones; seasonal phenomena; planting and propagation; flowering; plant breeding and heredity; insects and other pests; plant diseases; plants without seeds; seed plants; evolution; plant communities and conservation.

This well written, adequately illustrated and stimulating book is absolutely indispensable to every gardener, and is very highly recommended.

THE GEOGRAPHY OF THE FLOWERING PLANTS, by Ronald Good. 2nd ed. Longmans, Green & Co., 55 Fifth Ave., New York 3, N. Y. 1953. Pp. 452. Illus. $10.00.

Plant geography aims "to record, and then if possible to explain, the distribution of plants over the world's surface both in the present and the past". This thoroughly revised edition of the text on the geography of the flowering plants, first published in 1947, is a welcome addition to the plant science library. Following the stimulating introduction, the book is divided into two parts.

The first part is concerned with a purely descriptive account of the facts of distribution. The individual chapters are concerned with world geography, world floristic regions, general aspects of plant geography, distribution of plant families, genera and species, the British flora, and geological history and past distribution of flowering plants.

Part two deals with the theoretical consideration of the facts presented in the first part, and attempts to give a generalized explanation of them. The individual chapters are concerned with (a) the factors of distribution—a general review, climatic factors, edaphic factors, the dispersal of plants, changes in climate, geographical changes; (b) the theory of tolerance, and (c) conclusions. Appendix A deals with the statistics of the world's land surfaces, and Appendix B provides a list of discontinuous genera. The bibliography lists 629 references. The indices include a subject index, an index of plant names, and an index of persons and places.

This is an indispensable book for the specialist and also for plant scientists generally.

VEGETABLE AND FLOWER SEED PRODUCTION, by L. M. Hawthorn and L. H. Pollard. Blakiston Co., 575 Madison Ave., New York 22, N. Y. 1954. Pp. 626. Illus. $7.50.

This pioneering book on the "essential principles of seed production, combined with a practical discussion of the actual methods employed by

seed growers'' for seedmen, farmer-growers, seed companies' fieldmen, county agents, agricultural teachers and others, was ''designed to serve not only as a college textbook, but as a guide and a source of reference to the professional groups mentioned as well as anyone else who may have an interest in growing vegetable and flower seeds''.

The book is divided into four parts. Part I is devoted to the general organization and history of the vegetable- and flower-seed industry, together with the factors and problems directly related to the production of seeds. In Parts II and III, the methodology of growing vegetable and flower seeds is described; and Part IV is devoted to the handling of the matured seed—harvesting and milling equipment, seed storage, handling and marketing.

This concise and clearly written text fills a long felt need and will be enthusiastically welcomed.

BIOLOGICAL CONSERVATION — WITH PARTICULAR EMPHASIS ON WILDLIFE, by John D. Black. Blakiston Co., 575 Madison Ave., New York 22, N. Y. Pp. 328. Illus. 1954.

In this concise and clearly written text for the beginning student on the conservation of wildlife, including game and non-game forms of birds, mammals and fishes, ''a special effort is made to set wildlife against a proper environmental background.'' The use of educational films, and the ''lessons that the social scientist can learn from wildlife and the environment that supports wildlife'' are emphasized. The book is divided into six parts: Basic considerations—need for conservation, historical review, essentials of life, soil, water; The environment—basic ecology, standing water, running water, grasslands and wildlife, forests; Fish and other aquatic animals—game and pan fishes, rough fishes, forage fishes, reptiles and amphibians, invertebrates; Birds—upland game birds, ducks and geese, shore birds, predatory birds, songbirds and non-game birds; Mammals—fur bearers, game mammals, predatory mammals, other mammals; Solving the problem—administration of conservation. A selected and annotated bibliography (Appendix A), a fine guide (Appendix B), and the index complete this stimulating book which is highly recommended.

SOILS AND FERTILIZERS, by Firman E. Baer, 4th ed. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1953. Pl. 420. Illus. $6.00.

This completely rewritten 4th edition of a standard text on soils and fertilizers by an acknowledged authority will be enthusiastically welcomed. Although intended primarily for use in beginning courses in soils in agricultural colleges'', this book offers to all a reliable guide to a sound understanding of the principles of soil management and conservation. The topics discussed in the 27 chapters include the factors affecting plant growth; nitrogen, mineral and water requirements of crops; the origin and classification of soils; chemical composition of soils; some biological processes and physical properties of soils; soil water; soil air; soil solution; control of soil water; plowing and cultivating; organic matter; soil conservation; animal agriculture; nitrogen, phosphorus,

potassium, calcium, magnesium, sodium, and sulfur resources; trace elements; mixed fertilizers; selection and use of fertilizers; yield potentialities of crop plants; and miscellaneous topics.

This concisely and clearly written forward looking text is highly recommended for all as an easily readable and comprehensive treatise.

CHEMICAL CONTROL OF INSECTS, by T. F. West, J. E. Hardy, and J. H. Ford. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1953. Pp. 211. Illus. $3.25.

In this concise treatise the authors "have endeavored to provide a survey of the main insecticides emphasizing the more modern developments". They "compare and contrast the methods of using the main insecticides in addition to considering briefly the chemistry of the various substances." Following the introduction, the topics considered include the insect, outline of pest control, fumigation, nicotine, rotenone and related compounds, arsenical compounds, petroleum oils, coal tar derivatives, miscellaneous insecticides, soil insecticides and amendments, pyrethrum, lethane and thanite, chlorinated persistent insecticides, repellents and attractants, and weed control.

This stimulating text is recommended to all workers in the field of insect control.

PLANT ANATOMY, by Katherine Esau. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1953. Pp. 735. Illus. $9.00.

This comprehensive clearly and concisely written and adequately illustrated text on plant anatomy by an acknowledged authority has been composed primarily "for advanced students in various branches of plant science and for teachers of plant anatomy", but should also attract the less advanced students because the basic terms and concepts are explained and analyzed. In the presentation of the subject the orthodox sequence is followed, "considering first the cell and tissue types, then the arrangement of the structural elements within the plant organ." The developmental and phylogenetic aspects of the subject are considered in order to "enhance the understanding of the plant structures and their variability." The individual chapters are concerned with the plant body, the protoplast, the cell wall, the meristems and tissue differentiation, apical meristems, the vascular cambium, the epidermis, parenchyma, collenchyma, sclerenchyma, xylem, phloem, lactifers, the periderm, the stem, the leaf, the root, the flower, the fruit, and the seed.

This is without doubt a landmark in the production of plant anatomy texts, and is absolutely indispensable to all plant scientists.

GENERAL PHYSIOLOGY, by Bradley T. Scheer. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. Pp. 613. Illus. $7.00.

This stimulating text on general physiology for the advanced student offers a thorough "course in physiology which will provide an intelligible up-to-date picture of vital functions . . . offering a clear exposition of the nature and present status of the basic problems of physiology." This new book "embraces a wider range of topics than is usually found in similar texts. It gives considerable space to the general aspects of genetics, embryology, growth, cancer and aging; and emphasizes those

principles of physiology common to most organisms". The 19 chapters have been grouped under five major subdivisions—the physicochemical foundations of life, the chemical dynamics of life, the energy transformations in cells and organisms, the development of organisms, and the integration of the organism. There is an ample bibliography of 1453 references, and a subject index.

This new comprehensive text is highly recommended for the advanced student who has a grounding in general biology, general and organic chemistry, and the principles of physics, and who desires a "broad, meaningful picture of vital functions."

GENERAL BIOCHEMISTRY, by Joseph S. Fruton and Sophia Simmonds. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1953. Pp. 940. Illus. $10.00.

This fine new text on general biochemistry is intended primarily for advanced students who "wish to examine the structure of modern biochemistry from the general point of view". Attention is focused on principles, drawing illustrative data from studies with plants and microorganisms, as well as animals. Following the chapter on the scope and history of biochemistry, the book is divided into seven parts. The subjects covered include an extensive discussion of protein chemistry, the general properties of enzymes and of equilibrium rates in enzyme-catalyzed reactions, biological oxidation, intermediate metabolism of carbohydrates, lipids and nitrogen compounds; and the general aspects of metabolism. The extensive references to the literature are given as foot-notes to the text.

CYTOCHEMISTRY—A CRITICAL APPROACH, by J. F. Danielli. John Wiley & Sons, 440 Fourth Ave., New York 16, N. Y. 1953. Pp. 139. Illus. $4.00.

This third volume in the stimulating Biological Research Series is concerned with an almost undeveloped branch of science—cytochemistry—and is very largely a record of experiments carried out by the author and associated research workers. The subject matter of the introduction includes a brief historical background, a discussion of the importance of considering the chemical, physical and biological points of view in the development of rigorous methods of investigation, and the critical consideration of a number of techniques. The main part of the book is concerned with the fields of research—fixation procedures, studies on alkaline phosphatase, the critical study of the cytochemistry of aldehydes, the cytochemistry of proteins and nucleic acids, and quantitative studies in cytochemistry. The final chapter is concerned with the future outlook in cytochemistry.

THE METABOLISM OF ALGAE, by G. E. Fogg. John Wiley & Sons, New York. 1953. Pp. 149. Illus. $2.00.

This contribution, in the valuable Methuen & Co., series of little books, concerns the subject of the algal type of metabolism as a distinct field of study. Dr. Fogg has brought "together information scattered through a variety of scientific publications into a general account of the subject which will be of interest to students of botany, microbiology and

biochemistry". Chapter 1 is in the nature of a stimulating introduction to the subject, and this is followed by chapters on the phototrophic assimilation of carbon, the chemotrophic assimilation of carbon, autotrophic assimilation with special reference to nitrogen metabolism, heterotrophic assimilation, the products of metabolism, growth and metabolism, and a comprehensive summary and conclusions. There is a valuable biography including 309 references, and a complete subject index. This book is indispensable to those interested in biology.

GENERAL VIROLOGY, by S. E. Luria. John Wiley & Sons. 440 Fourth Ave., New York 16, N. Y. 1953. Pp. 427. Illus. $8.50.

In this pioneering text on general virology, intended for graduate and advanced undergraduate students, the subject is "presented as a biological science, like botany, zoology, or general bacteriology." The facts and methods of virology as a whole are considered, and no attempt is made to describe the individual virus diseases. The topics considered in the 19 chapters include (1) a survey of viruses; range of existence; nomenclature and classification; (2) the detection and titration of viruses; (3) the properties of viruses outside the host; (4) the virus-host interaction; (5) viruses in nature; (6) the origin and nature of viruses, and (7) the Rickettsiae.

This stimulating text is an indispensable addition to the biological library.

A TEXTBOOK OF GENERAL BOTANY, 5th ed., by Gilbert M. Smith, E. M. Gilbert, G. S. Bryan, R. I. Evans and J. F. Stauffer. Macmillan Co., 60 5th Ave., New York. pp. 606. Illus. 1953. $6.25.

This easily readable revision of a standard text for use in connection with the first year botany course is "designed to help the student explore and understand the world of plants so essential to man and other living things".

The first of the 33 chapters deals with the inter-relations of plants and animals, including man. This is followed by discussions of the life cycle of a familiar plant; the structure and function of cells, nuclear and cell division; the roots, stems, buds and leaves of the plant; the nutrition and metabolism, water relations, growth and movement, classification, meiosis and the life cycle of plants; some classes of algae, the classes of fungi, lichens, the classes of bryophyta—liverworts, hornworts and mosses, the vascular plants—psilophytes, horestails, lycopods, ferns, gymnosperms and angiosperms; fruits and seeds; fossil plants; inheritance and variation; and the major regions of vegetation in North America.

As in the past, the authors have succeeded in presenting the subject with a minimum of technical jargon which is all to the good in a beginning botany course. This clearly and concisely written, adequately illustrated text is very highly recommended.

[PLANT LIFE LIBRARY, continued on page 4.1

THE AMERICAN PLANT LIFE SOCIETY

For the roster of the general officers of the Society, the reader is referred to the inside front cover of this volume.

I. THE AMERICAN AMARYLLIS SOCIETY

[An integral branch of the APLS, and functions as a comprehensive Committee for the Advancement of the Amaryllids.]

[AMERICAN AMARYLLIS SOCIETY, continued from page 2.]

(c) REGISTRATION OF PLANT NAMES

Registrars: Dr. J. B. S. Norton, and Prof. W. R. Ballard.
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FLOWER TYPES AND SCORE CARD FOR HYBRID AMARYLLIS

For classification of flower types and score card for Hybrid Amaryllis see PLANT LIFE (Herbertia) 10: 23-30. 1954.

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Mr. W. Quinn Buck, in charge of Daylily Trial Garden, Los Angeles Arboretum, 291 No. Old Ranch Road, Arcadia, Calif.

Note: Introducers of new daylily clones should send plants directly to the Trial gardens for testing. As soon as practical each trial garden will publish, in HERBERTIA, lists of the 10, 25, 50 and 100 best daylilies, on the basis of the clones tested, for the climatic region in which it is located.

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III. PUBLICATIONS OF THE AMERICAN PLANT LIFE SOCIETY

BOOKS

1. AMARYLLIDACEAE: TRIBE AMARYLLEAE, by Traub & Moldenke (including the genera Amaryllis, Lycoris, Worsleya, Lepidopharynx, Placea, Griffinia, and Ungernia; Manila covers; 194 pages, incl. 18 illustrations. $4.00 postpaid.
This is required reading for every amaryllid enthusiast.

2. DESCRIPTIVE CATALOG OF HEMEROCALLIS CLONES, 1893—1948, by Norton, Stuntz, and Ballard. A total of 2695 Hemerocallis clones are included and also an interesting foreword, and explanatory section about naming daylilies. Manila covers; 100 pages (I—X; 1—90), including a portrait of George Yeld. $1.50 postpaid.

PERIODICALS

(A) HERBERTIA [First series, 1934 to 1948, incl.], devoted exclusively to the amaryllids (Amaryllidaceae), and the workers concerned in their advancement. A complete set of these volumes is indispensable to all who are interested in the amaryllids. Libraries should note that this is the last opportunity for complete sets.

Volume 1 (1934). Dedicated to **Henry Nehrling.** Containing the biography of Henry Nehrling, and many valuable articles on amaryllis; with a portrait of Henry Nehrling and 16 other illustrations; a total of 101 pages.

Volume 2 (1935). Dedicated to **Theodore L. Mead.** Containing the autobiography of Theodore L. Mead, and many excellent articles on varieties, breeding, propagation, and culture of amaryllids; with portraits of Theodore L. Mead and David Griffith and 18 other illustrations; a total of 151 pages.

Volume 3 (1936). Dedicated to **Arthington Worsley.** Containing the autobiography of Arlington Worsley, and important articles on description, genetics and breeding, physiology of reproduction, and amaryllid culture; with 3 portraits of Arlington Worsley, one color plate, and 30 other illustrations; a total of 151 pages.

Volume 4 (1937). First British Edition. Dedicated to William Herbert. Containing the biography of William Herbert; the reprint of Herbert's essay, "On Crosses and Hybrid Intermixtures in Vegetables"; Dr. Darlington's essay, "The Early Hybridizers and the Origins of Genetics," and many important articles on description; cytology, genetics and breeding; physiology of reproduction, and amaryllid culture; with two portraits, forty-four other plates and three figures; a total of 280 pages.

Volume 5 (1938). First Netherlands Edition. Dedicated to Ernst H. Krelage. Containing the autogiography of Ernst H. Krelage; the history of amaryllid culture in Holland by Ernst H. Krelage, Dr. Uphof's important article in which the name Hippeastrum is rejected; a revision of the tribes of the Amaryllidaceae; and the species of Amaryllis; outstanding articles on forcing amaryllis by Dr. Grainger and Prof. Dr. van Slogteren; and many other articles on description, cytology, genetics

and breeding; physiology of reproduction, and amaryllid culture; with 33 plates and 2 figures; a total of 218 pages.

Volume 6 (1939). Dedicated to the Union of **South Africa,** and containing articles on South African amaryllids, including the history of botanical exploration for amaryllids in South Africa, the distribution of South African amaryllids in relation to rainfall, and a review of the genus Agapanthus by Frances M. Leighton, a review of the Genus Cyrtanthus, with many excellent line drawings, by Dr. R. A. Dyer; other articles—Zephyranthes of the West Indies by Dr. Hume; the Tribe Gilliesieae by Dr. Hutchinson; rating of daylilies for garden value by Mr. Kelso; daffodil articles by Jan de Graaff, and many other items on description, cytology, breeding, propagation, and amaryllid culture; with 44 plates and 10 figures; a total of 258 pages.

Volume 7 (1940). Dedicated to **Latin America,** and featuring articles on Latin American amaryllids; biographies of Drs. Philippi and Holmberg; report by Dr. Goodspeed on the amaryllids collected by the Univ. of Calif., Second Andean Expedition; reports on the flowering of the "Blue Amaryllis," A. procera; and many other important articles on the description, propagation, breeding, culture, harvesting and storage of amaryllids. Of special interest are the important articles on the description, breeding and culture of daylilies by noted authorities. With 45 illustrations—30 plates and 15 figures—and a total of 242 pages.

Volume 8 (1941). First Daylily Edition. The first extensive symposium on the daylily, containing biographies of George Yeld, Amos Perry, Hans Sass, and Paul Cook, and important articles on daylily evaluation, breeding, propagation and culture. Also important articles on Narcissus and other amaryllids. Thirty-eight illustrations—27 plates and 11 figures—and a total of 185 pages.

Volume 9 (1942). First Alstroemerid Edition. Dedication to Harry L. Stinson, the outstanding authority on this plant group, who contributes a summary of his work on Alstroemerid taxonomy, breeding, propagation and culture. This volume contains the autobiography of Prof. Dr. Abilio Fernandes, the Check-List of Amaryllids by Major Pam, and a review of the species of Crinum by Dr. Uphof, and also many important articles on daylilies, Narcissus, Cyrtanthus, hybrid Amaryllis, Ixiolirion and other amaryllids. Thirty-five illustrations—17 plates and 18 figures—and a total of 243 pages.

Volume 10 (1943). 10th Anniversary Edition. Dedicated to Elizabeth Lawrence, the outstanding authority on the use of amaryllids in the garden, who contributes a summary of her work in this field. This volume contains the review of Agapanthus and Tulbaghia, by Dr. Uphof; and article on Brunsvigia rosea and hybrids by Mr. Hannibal; a symposium on Narcissus breeding by Messrs. Powell, Reinelt, Berry and Reynolds; a review of amaryllid chromosomes by Dr. Flory; articles on hybrid amaryllis, daylilies, and many other important articles on amaryllids. Forty-one illustrations—12 plates and 29 text figures—and a total of 205 pages.

Volume 11 (1944). First Allieae Edition. Dedicated to Dr. Henry A. Jones, the eminent American authority on the onion. This is one of the most outstanding issues up to the present for its record making contributions on the systematics of Allium by British authorities, and on onion breeding, propagation, and culture by American authorities. It contains Mr. Airy Shaw's translation of Vvedensky's Allinus of the Soviet Union; Stern's essay on the onion in the Old World and other articles; and articles on onion breeding, propagation and culture by Dr. Jones and his colleagues. There are also important contributions on ornamental Alliums for North America, and Allieae of North America. There are excellent articles on hybrid Amaryllis, Daylilies and various other amaryllids. Forty-three illustrations—25 plates and 18 text figures—and a total of 369 pages.

Volume 12 (1945). First Educational Edition. Dedicated to Supt. R. C. Huey, a pioneer in the use of amaryllids as an educational tool. This volume contains a brief autobiography by Supt. Huey, and an article by him on the use of amaryllids in teaching plant science; the announcement by Mulford B. Foster of the reintroduction of the sweet-scented Alstroemeria caryophyllaea, and an article by Harry L. Stinson on the true Alstroemeria Ligtu. This issue also contains an article on the origin of Tapeinanthus humilis by A. & R. Fernandes; important articles on Narcissus breeding; Leucocoryne and related genera; articles on various other amaryllids, including valuable contributions on Hemerocallis description and appreciation, breeding, culture, and packing daylily plants for shipping. Twenty-four illustrations—15 plates and 10 text figures—a total of 180 pages.

Volume 13 (1946). First Narcissus Edition. Dedicated to Guy L. Wilson, the noted Narcissus breeder. This volume contains an autobiography of Mr. Wilson, an article on his breeding activities; an article on Narcissus breeding in Australia by Mr. Alston; articles by American Narcissus breeders, including Frank Reinelt, E. P. Powell, J. S. Cooley, C. W. Culpepper and W. R. Ballard; an article on the karyology of the subgenus Ajax of the genus Narcissus by A. and R. Fernandes; a list of parents of hybrid Narcissus by Arno H. Bowers; Narcissus diseases by C. J. Gould; Narcissus insects and mites by E. P. Breakey; Narcissus culture by various authors. There are also articles on other amaryllids—Hemerocallis, hybrid Amaryllis, Habranthus, Crinums, Lapagerias, Agapanthus, Hymenocallis, etc. Thirty-nine illustrations—186 pages.

Volume 14 (1947). 2nd Hemerocallis Edition. Dedicated to Ralph W. Wheeler, the noted Daylily breeder. This volume contains an autobiography of Mr. Wheeler and an article on his breeding activities; and many important articles on Hemerocallis description, evaluation, breeding, etc., from various parts of the country. There are also important articles on other amaryllis—Hybrid Amaryllis, amaryllids in the Holy Land and Mexico, starch in Alstroemeria, the Galantheae, Double Narcissus, Zephyranthes, Sternbergia, Allium, etc. Twenty-eight illustrations—206 pages.

Volume 15 (1948). 2nd South African Edition. Dedicated to Dr. R. A. Dyer. This volume contains an autobiography of Dr. Dyer and two amaryllid articles by him, and other articles on South African amaryllids. There are also important articles on Hemerocallis, Amaryllis, Crinum, Narcissus, Brodiaea Lilies, Alstroemerias and other amaryllids by various authors. Forty-one illustrations—177 pages.

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(B) PLANT LIFE, including numbers on various plant subjects, 1945 to date; and the **Second Series** of **HERBERTIA,** 1949 to date. It should be noted that the numbers of **HERBERTIA** of the **second series,** beginning in 1949, are in every way equivalent to those of the first series, and are devoted exclusively to the amaryllids.

A limited number of volumes of **Plant Life,** including **Herbertia,** second series, are available, all quotations subject to prior sale.

Vol. 1 (Nos. 1—3). 1945. Symposium on **Narcissus** breeding by various authors. **First Bromeliaceae Edition.** Profusely illustrated symposium on the

bromels by Dr. Lyman B. Smith, Mulford B. and Racine Foster, David Barry, Jr., Ladislaus Cutak, and Wyndham Hayward. **25 illustrations—105 pages.**

Vol. 2 (Nos. 1—3). 1946. **Verbenaceae Edition.** Illustrated treatise on the Verbena Family by Dr. and Mrs. Moldenke, the outstanding authorities on this plant family. 9 illustrations—100 pages.

Vol. 3 (Nos. 1—3). 1947. **General Edition.** Containing an illustrated article on winter and spring flowering Gladiolus by W. M. James, and articles on the Dutch Bulb Industry by Dr. A. J. Verhage and J. F. Ch. Dix. 10 illustrations—42 pages

Vol. 4 (Nos. 1—3). 1948. **Aroid Lily Edition.** An illustrated treatise primarily on the genus Zantedeschia (Aroid Lily) containing articles by Hamilton P. Traub, A. A. Longmire, Fred M. Danks, H. M. Butterfield, Wyndham Hayward and Len Mirzwick. 11 illustrations—48 pages.

Vol. 5 (Nos. 1—4) 1949. 34 illustrations, a total of 134 pages.

Gesneriaceae Edition, with important articles on the subject by F. E. Smith, W. Hayward and the Moshers.

1949 HERBERTIA Edition, devoted exclusively to the amaryllids; the **First Australian Edition,** dedicated to Capt. C. O. Fairbairn, with biographies of Australian amaryllid pioneers, and articles on Australian amaryllids, South African amaryllids, the Pink Amaryllis, **A. belladonna** var. **Haywardii,** with illustration, hybrid Amaryllis breeding in South Australia by E. Both, Narcissus culture by Dr. Cooley, Mr. Mitsch and Mr. Ballard, and also important articles on other amaryllids.

Vol. 6 (Nos. 1—4) 1950. 47 illustrations, a total of 162 pages.

1950 HERBERTIA Edition, devoted exclusively to the amaryllids; the Hybrid Amaryllis Edition; dedicated to Mrs. Mary G. Henry, containing Mrs. Henry's autobiography; articles on Collection Amaryllids in South America by M. B. Foster; Amaryllis flower types; double Amaryllis; Amaryllis of To-morrow, by W. Hayward, and other articles on hybrid Amaryllis, Hemerocallis, Cyrtanthus, Blue Amaryllis, South African Amaryllids, Review of the genus Brunsvigia (part I) by R. A. Dyer, etc.

Caladium Edition, with articles on Caladium by W. Hayward, on Winter Jasmine by Prof. Norton, on Bartram's Ixia by W. Hayward, and Plant Life Library (book reviews), the American Plant Life Society, and Seeds and Plants Directory.

Vol. 7 (Nos. 1—4) 1951. 51 illustrations, a total of 174 pages.

1951 HERBERTIA Edition, devoted exclusively to the amaryllids; the **Latin American Amaryllid Exploration Edition,** dedicated to M. B. Foster; containing Mr. Foster's autobiography, and articles on Collecting Amaryllids in Latin America by M. B. Foster, new South American Amaryllis species and other amaryllid species, Amaryllis Exhibition at Cleveland, New Orleans Amaryllis Show, Review of the genus Brunsvigia (part II) by R. A. Dyer, Hybrid Amaryllis trials at Valleevue, by Thos. R. Manley, new pink hybrid Amaryllis, Narcissus culture by Mr. Mitsch, and Dr. Cooley; Hemerocallis culture by Mr. Lenington, Hemerocallis polyploids, and other amaryllid articles.

Gloriosa Lily Edition, with articles on the Gloriosa Lily by W. Hayward, plant growing experiences by W. Allgeyer, Western Trip by Mrs. Henry, Plant Life Library (book reviews), the American Plant Life Society, and Seeds and Plants Directory.

Vol. 8 (Nos. 1—4) 1952, with 34 illustrations, a total of 183 pages.

1952 HERBERTIA Edition, devoted exclusively to the amaryllids: the **Second Alstroemeria Edition,** dedicated to Dr. Uphof, containing an autobiography of Dr. Uphof, a review of the genus Alstroemeria by Dr. Uphof, the Amaryllis Displays at Cleveland, and New Orleans, the Orlando-Winter Park Hemerocallis show, Amaryllis evaluation by Thos. R. Manley, Dr. Thornburgh, C. E. Buck, E. Douglas, and Hermen Brown; articles on Fragrant Alstroemeria hybrids by M. B. Foster, advances in Alstroemeria culture by Harry L. Stinson, Alstroemeria articles by Prof. Bullock, Prof. Ballard, Mr. Ruckman, and E. O. Orpet. The issue also contains descriptions of a

new Amaryllis species, and a new Zephyranthes species, and articles on Zephyranthes by Mrs. Clint, on Lapiedra martinezii by Dr. Fernandes, Alliums by B. Harkness, amaryllid garden material by W. L. Hunt and Thad Howard, Narcissus culture by Mr. Mitsch, Crinum zeylanicum by Mr. Hayward, Hemerocallis by Mr. Gilmer, and Mrs. Henry, Hymenocallis by Mr. Woelfle, Amaryllid color by Mr. Hannibal, and other important articles.

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Vol. 9. (Nos. 1—4) 1953, with 32 illustrations, a total of 166 pages.

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There are also articles on other amaryllids, including reviews of Amaryllis Shows in New Orleans and Houston, papers on the evaluation of Hybrid Amaryllis by Mr. Manley and Dr. Thornburgh, an article on Allium by R. B. Freeman, Amaryllis species by Mrs. Mary G. Henry, the Orpets, and Mr. Burlingham, Hemerocallis by S. E. Saxton, George Gilmer, and W. R. Ballard, Calostemma by Mr. Chandler, Crinum scabrum by Thad M. Howard, Lycoris by Wyndham Hayward, Hymenocallis by Len Woelfle, and on other amaryllid subjects, including the description of two new Amaryllis species.

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Vol. 10. (Nos. 1—4) 1954, with 23 illustrations, a total of 143 pages.

1954 HERBERTIA EDITION, devoted exclusively to the Amaryllids; sponsored by the American Amaryllis Society, which is affiliated with the American Plant Life Society. This is the **Second Amaryllis Edition,** dedicated to Thomas R. Manley, M. S., and contains an autobiography of Mr. Manley and three valuable articles by Mr. Manley on the evaluation, forcing culture and merchandising of Amaryllis; articles on the Divisions of cultivated Amaryllis by H. P. Traub, evaluation of Amaryllis by Dr. Thornburgh, the McCulloch hybrid Amaryllis by Edith B. Strout and Polly Anderson, Amaryllis and other amaryllid culture by Armyn Spies, Mrs. W. D. Morton, Wyndham Hayward, Mrs. Jo. N. Evans, and Dr. Philip G. Corliss; Amaryllis insects and mites by Dr. Floyd F. Smith and C. L. Burlingham; Amaryllis propagation by John T. Weisner; Amaryllis flower arrangements by Dr. Philip G. Corliss; Hemerocallis by Prof. W. R. Ballard, S. E. Saxton, and W. Quinn Buck; Narcissus by Dr. Cooley and Prof. Ballard; Alliums and Zephyranthes by Thad M. Howard, the New Orleans and Mobile Amaryllis shows for 1953, and other interesting articles.

The **General Edition,** contains articles on the Giant Aborescent Philodendrons and the Delightful Ginger Lilies by Wyndham Hayward, the genus Nothoscordum by H. P. Traub, a note on the new Code for naming Cultivated plants, the Plant Life Library (book reviews), the American Plant Life Society, a complete list of publications, and seeds and Plants Directory.

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THE MACMILLAN WILD FLOWER BOOK, with descriptive text by C. J. Hylander; and illustrations by Edith F. Johnston. Macmillan Co., 60 Fifth Ave., New York 11, N. Y. Pp. 480, illus. 1954. $15.00.

The 230 excellent color plates presented in this outstanding book are reproduced from paintings by the well-known flower portraitist, Mrs. Edith Farrington Johnston. The more than 500 plants described by Dr. Hylander "cover the region from the East coast to the Rockies, and often beyond, and from Florida to southern Canada." In the introduction, Dr. Hylander provides an outline for the identification of plants, and at the end of the book, the publishers in collaboration with a number of botanists present a guide to the flower families described. This book is notable not only for the variety and artistic quality of the color plates, but also for their accuracy.

AMARYLLIS—and How to Grow Them, by Peggie Schulz. M. Barrows & Co., 425 Fourth Ave., New York 16, N. Y. 1954. Pp. 128. Illus. $2.95.

Most of the space in this little book is concerned with Amaryllis, but very brief sections on Clivia, Cooperia, Crinum, Eucharis, Haemanthus, Nerine, Sprekelia, Sternbergia, Vallota and Zephyranthes are also included. In the short space of 128 pages the treatment has to be necessarily limited to the barest outline. Mrs. Schulz writes in an easily readable style, and thus this book should serve to introduce the amaryllids to a still greater number of gardeners.

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HAMILTON P. TRAUB
HAROLD N. MOLDENKE

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